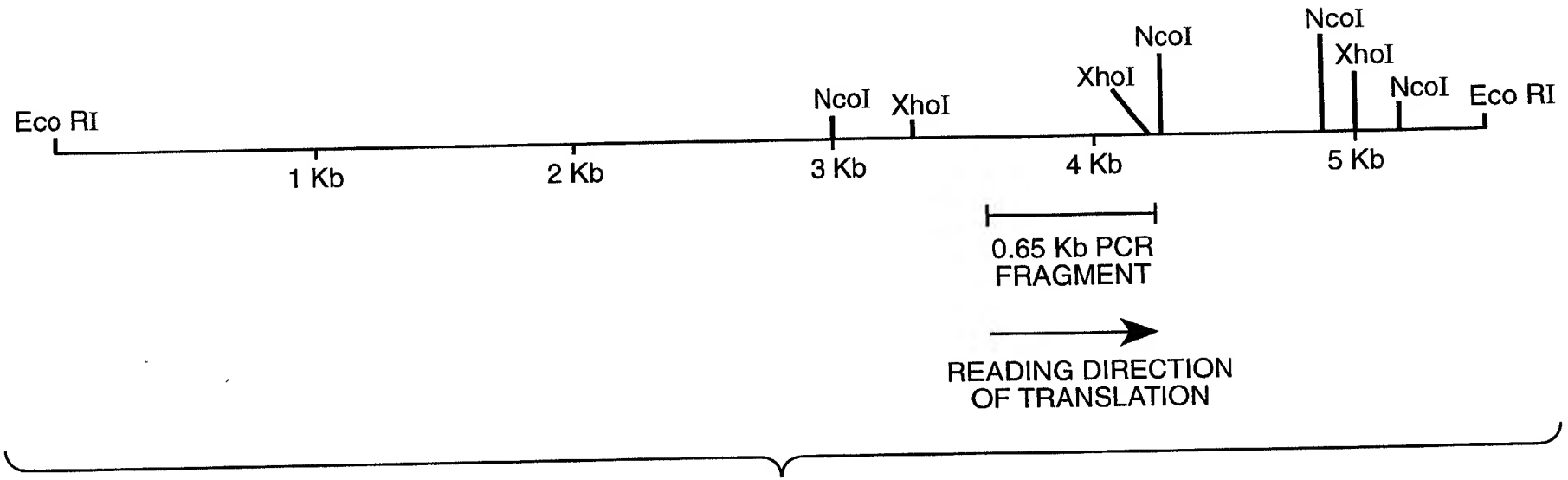

Eco RI
1 Kb
2 Kb
NcoI
XhoI
3 Kb
XhoI
NcoI
4 Kb
NcoI
XhoI
NcoI
Eco RI
5 Kb
0.65 Kb PCR
FRAGMENT
READING DIRECTION
OF TRANSLATION

FIG. 1

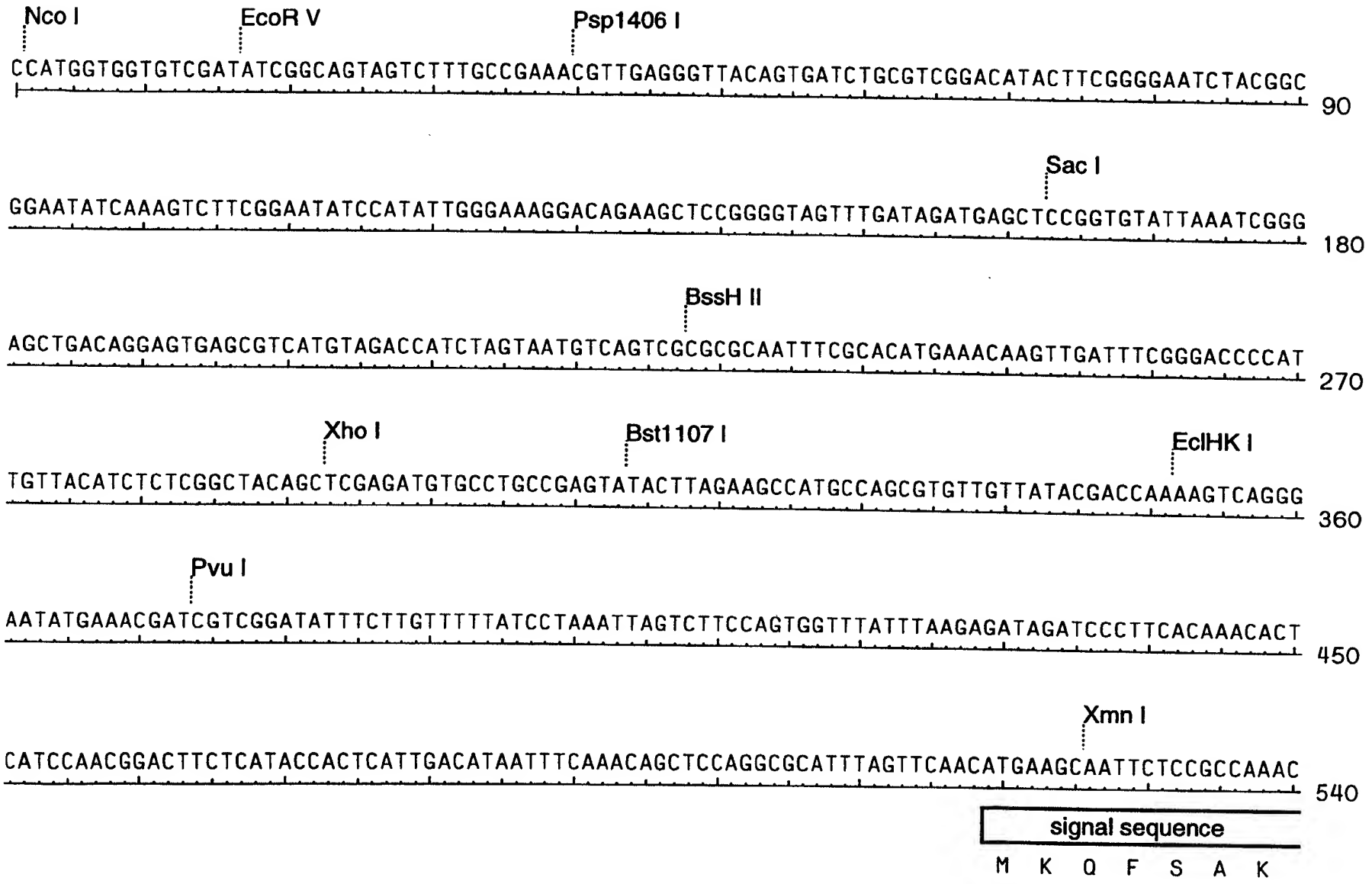


FIG. 2A

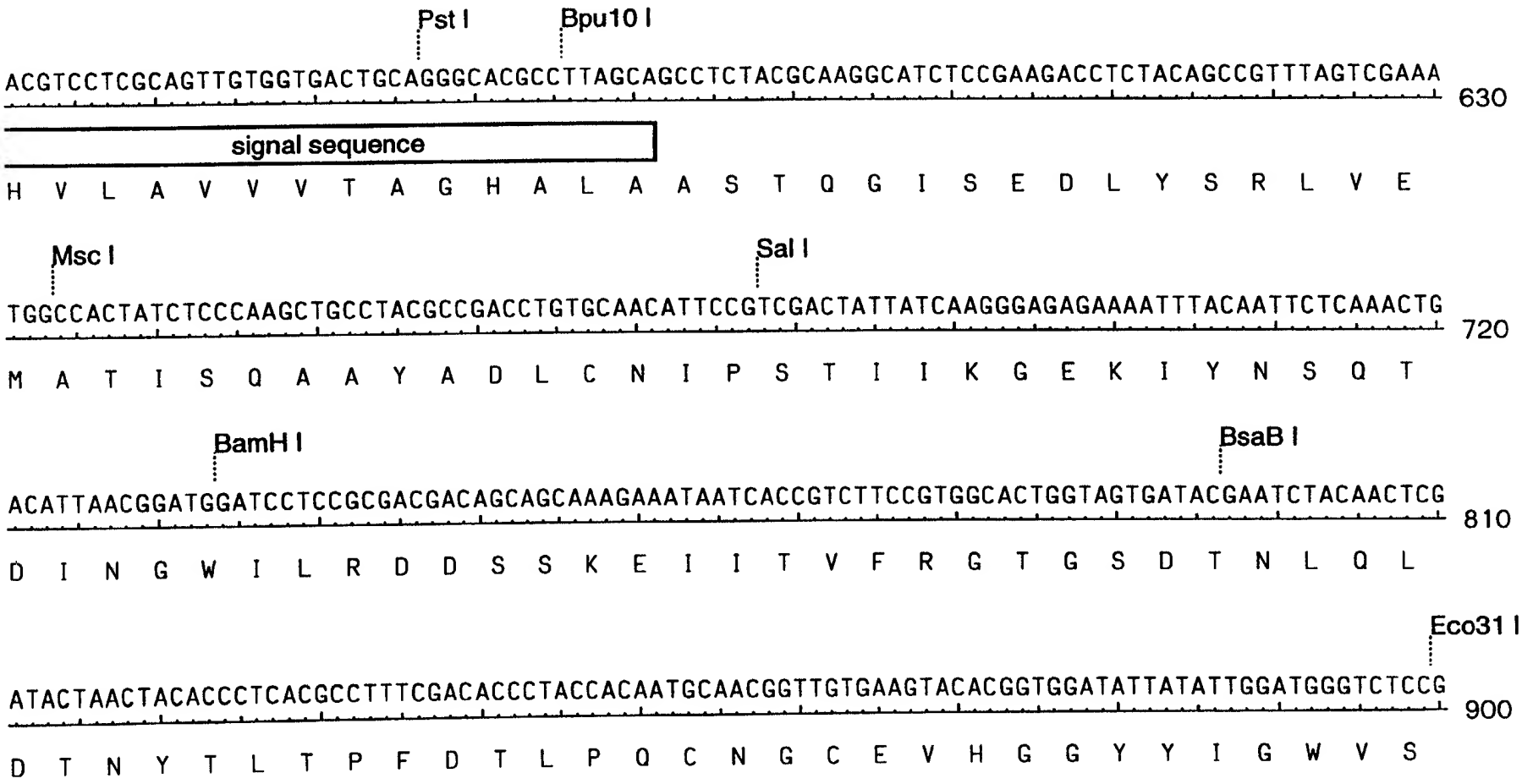


FIG. 2B

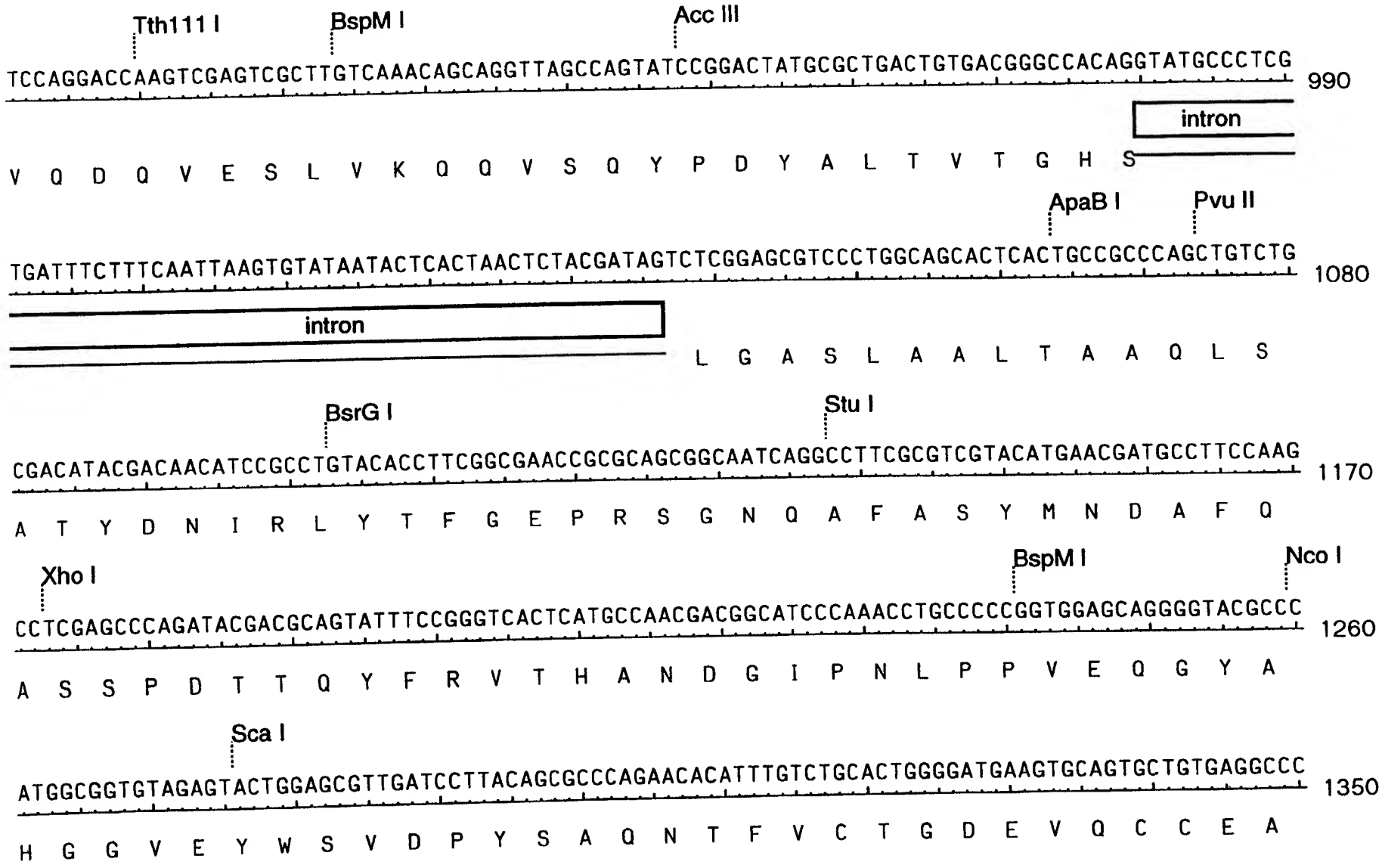

Tth111 I
BspM I
Acc III
TCCAGGACCAAGTCGAGTCGCTTGTCAAACAGCAGGTTAGCCAGTATCCGGACTATGCGCTGACTGTGACGGGCCACAGGTATGCCCTCG
990
intron
V Q D Q V E S L V K Q Q V S Q Y P D Y A L T V T G H S
ApaB I
Pvu II
TGATTTCTTTCAATTAAGTGTATAATACTCACTAACTCTACGATAGTCTCGGAGCGTCCCTGGCAGCACTCACTGCCGCCCAGCTGTCTG
1080
intron
L G A S L A A L T A A Q L S
BsrG I
Stu I
CGACATACGACAACATCCGCCTGTACACCTTCGGCGAACCGCGCAGCGGCAATCAGGCCTTCGCGTCGTACATGAACGATGCCTTCCAAG
1170
A T Y D N I R L Y T F G E P R S G N Q A F A S Y M N D A F Q
Xho I
BspM I
Nco I
CCTCGAGCCCAGATACGACGCAGTATTTCCGGGTCACTCATGCCAACGACGGCATCCCAAACCTGCCCCCGGTGGAGCAGGGGTACGCCC
1260
A S S P D T T Q Y F R V T H A N D G I P N L P P V E Q G Y A
Sca I
ATGGCGGTGTAGAGTACTGGAGCGTTGATCCTTACAGCGCCCAGAACACATTTGTCTGCACTGGGGATGAAGTGCAGTGCTGTGAGGCCC
1350
H G G V E Y W S V D P Y S A Q N T F V C T G D E V Q C C E A

FIG. 2C

FIG._2D

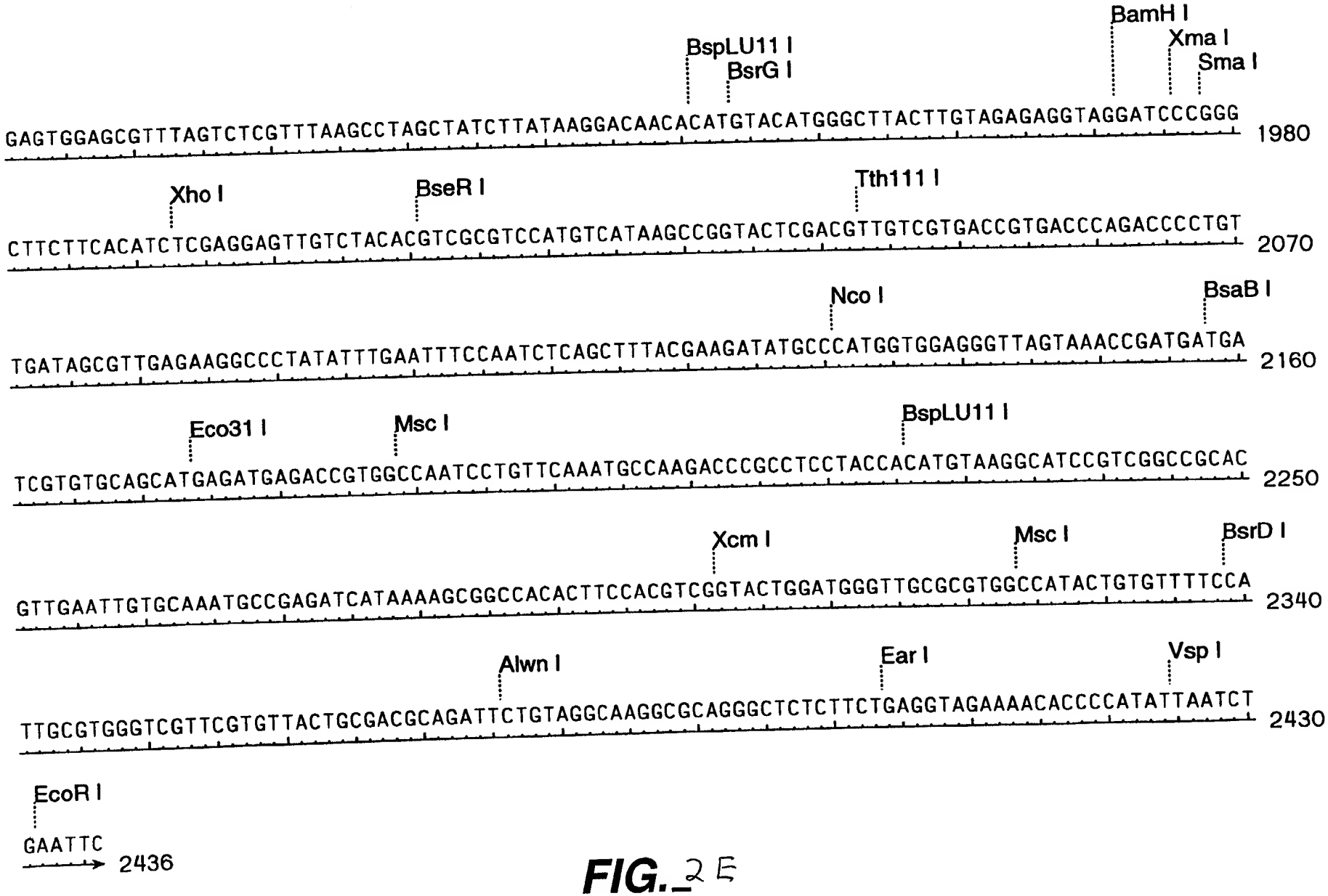


FIG._2E

CCATGGTGGTGTCGATATCGGCAGTAGTCTTTGCCGAAACGTTGAGGGTTACAGTGATCTGCGTCGGACATACTT
CGGGGAATCTACGGCGGAATATCAAAGTCTTCGGAATATCCATATTGGGAAAGGACAGAAGCTCCGGGGTAGTTT
GATAGATGAGCTCCGGTGTATTAAATCGGGAGCTGACAGGAGTGAGCGTCATGTAGACCATCTAGTAATGTCAGT
CGCGCGCAATTTCGCACATGAAACAAGTTGATTTCGGGACCCCATTGTTACATCTCTCGGCTACAGCTCGAGATG
TGCCTGCCGAGTATACTTAGAAGCCATGCCAGCGTGTTGTTATACGACCAAAAGTCAGGGAATATGAAACGATCG
TCGGATATTTCTTGTTTTTATCCTAAATTAGTCTTCCAGTGGTTTATTTAAGAGATAGATCCCTTCACAAACACT
CATCCAACGGACTTCTCATACCACTCATTGACATAATTTCAAACAGCTCCAGGCGCATTTAGTTCAACATGAAGC
AATTCTCCGCCAAACACGTCCTCGCAGTTGTGGTGACTGCAGGGCACGCCTTAGCAGCCTCTACGCAAGGCATCT
CCGAAGACCTCTACAGCCGTTTAGTCGAAATGGCCACTATCTCCCAAGCTGCCTACGCCGACCTGTGCAACATTC
CGTCGACTATTATCAAGGGAGAGAAAATTTACAATTCTCAAACTGACATTAACGGATGGATCCTCCGCGACGACA
GCAGCAAAGAAATAATCACCGTCTTCCGTGGCACTGGTAGTGATACGAATCTACAACTCGATACTAACTACACCC
TCACGCCTTTCGACACCCTACCACAATGCAACGGTTGTGAAGTACACGGTGGATATTATATTGGATGGGTCTCCG
TCCAGGACCAAGTCGAGTCGCTTGTCAAACAGCAGGTTAGCCAGTATCCGGACTATGCGCTGACTGTGACGGGCC
ACAGGTATGCCCTCGTGATTTCTTTCAATTAAGTGTATAATACTCACTAACTCTACGATAGTCTCGGAGCGTCCC
TGGCAGCACTCACTGCCGCCCAGCTGTCTGCGACATACGACAACATCCGCCTGTACACCTTCGGCGAACCGCGCA
GCGGCAATCAGGCCTTCGCGTCGTACATGAACGATGCCTTCCAAGCCTCGAGCCCAGATACGACGCAGTATTTCC
GGGTCACTCATGCCAACGACGGCATCCCAAACCTGCCCCCGGTGGAGCAGGGGTACGCCCATGGCGGTGTAGAGT
ACTGGAGCGTTGATCCTTACAGCGCCCAGAACACATTTGTCTGCACTGGGGATGAAGTGCAGTGCTGTGAGGCCC
AGGGCGGACAGGGTGTGAATAATGCGCACACGACTTATTTTGGGATGACGAGCGGAGCCTGTACATGGTGATCAG
TCATTTCAGCCTCCCCGAGTGTACCAGGAAAGATGGATGTCCTGGAGAGGGCATGCATGTACGTATACCCGAAGC
ACACTTTTTCGGTAAATCAGGACATGTAATAAGTTCCTTCCATGAATAGATATGGTTACCCTCACCATAAGCCTT
GAGGTTGCCTTTCTCTTTTGATTGTGAATATATATTTAAAGTAGATGACAGATATCTCTAAACACCTTATCCGCT
TAAACCCATCATAGATTGTGTCACGTGATAGACCCCTTGAATGATGAGCGAAATGTATCAGTCCCGTTTAAATCA
AACCCTTTCAGCCTAGCACAGTCAGAATACACCAACCCCATTCTAAGGTAGTACTAAATATGAATACAGCCTAAA
TGCATCGCTATATGATCCCATAAAGAAGCAACAACCTTTCAGATCTCGTTTTGCGCTGCGAAGAGCTAGCTCTAC
CATGGTCTCAATTATGAGTGGAGCGTTTAGTCTCGTTTAAGCCTAGCTATCTTATAAGGACAACACATGTACATG
GGCTTACTTGTAGAGAGGTAGGATCCCGGGCTTCTTCACATCTCGAGGAGTTGTCTACACGTCGCGTCCATGTCA
TAAGCCGGTACTCGACGTTGTCGTGACCGTGACCCAGACCCCTGTTGATAGCGTTGAGAAGGCCCTATATTTGAA
TTTCCAATCTCAGCTTTACGAAGATATGCCCATGGTGGAGGGTTAGTAAACCGATGATGATCGTGTGCAGCATGA
GATGAGACCGTGGCCAATCCTGTTCAAATGCCAAGACCCGCCTCCTACCACATGTAAGGCATCCGTCGGCCGCAC
GTTGAATTGTGCAAATGCCGAGATCATAAAAGCGGCCACACTTCCACGTCGGTACTGGATGGGTTGCGCGTGGCC
ATACTGTGTTTTCCATTGCGTGGGTCGTTCGTGTTACTGCGACGCAGATTCTGTAGGCAAGGCGCAGGGCTCTCT
TCTGAGGTAGAAAACACCCCATATTAATCTGAATTC

FIG.3

Figure 4

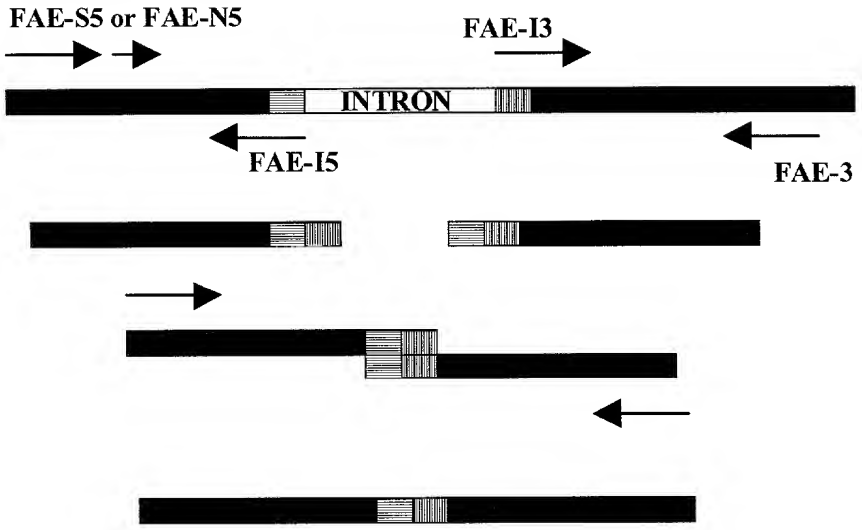


Figure 5

FAE-I3 CCGGCCACGCCCTCGGCGCCTCCCTGGCGGCACTC 35-mer
FAE-I5 GGCGCCGAGGGAGTGGCCGGTCACGGTCAGCGCGTAGTCC 40-mer

i intron position in original

Y A L T V T G H S L G A S L A A L
GGACTACGCGCTGACCGTGACCGGCCACTCCCTCGGCGCC complement, FAE-I5
CCGGCCACGCCCTCGGCGCCTCCCTGGCGGCACTC FAE-I3
Y A L T V T G H A L G A S L A A L

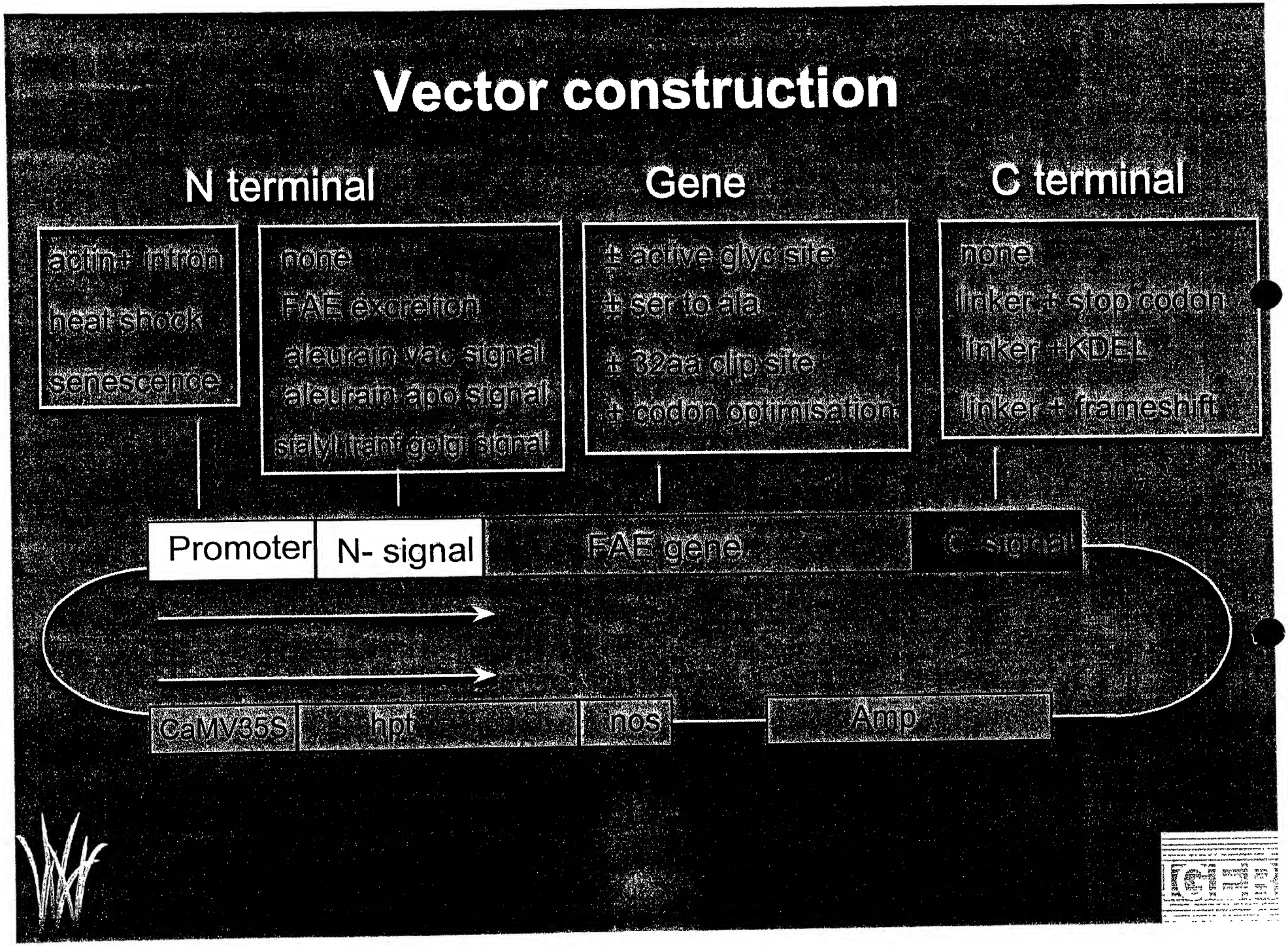

Vector construction
N terminal
Gene
C terminal
actin+ intron
heat shock
senescence
none
FAE excretion
aleurain vac signal
aleurain apo signal
sialyl tranf golgi signal
± active glyc site
± ser to ala
± 32aa clip site
± codon optimisation
none
linker + stop codon
linker +KDEL
linker + frameshift
Promoter
N- signal
FAE gene
C signal
CaMV35S
hpt
nos
Amp

Fig 6

Figure 2

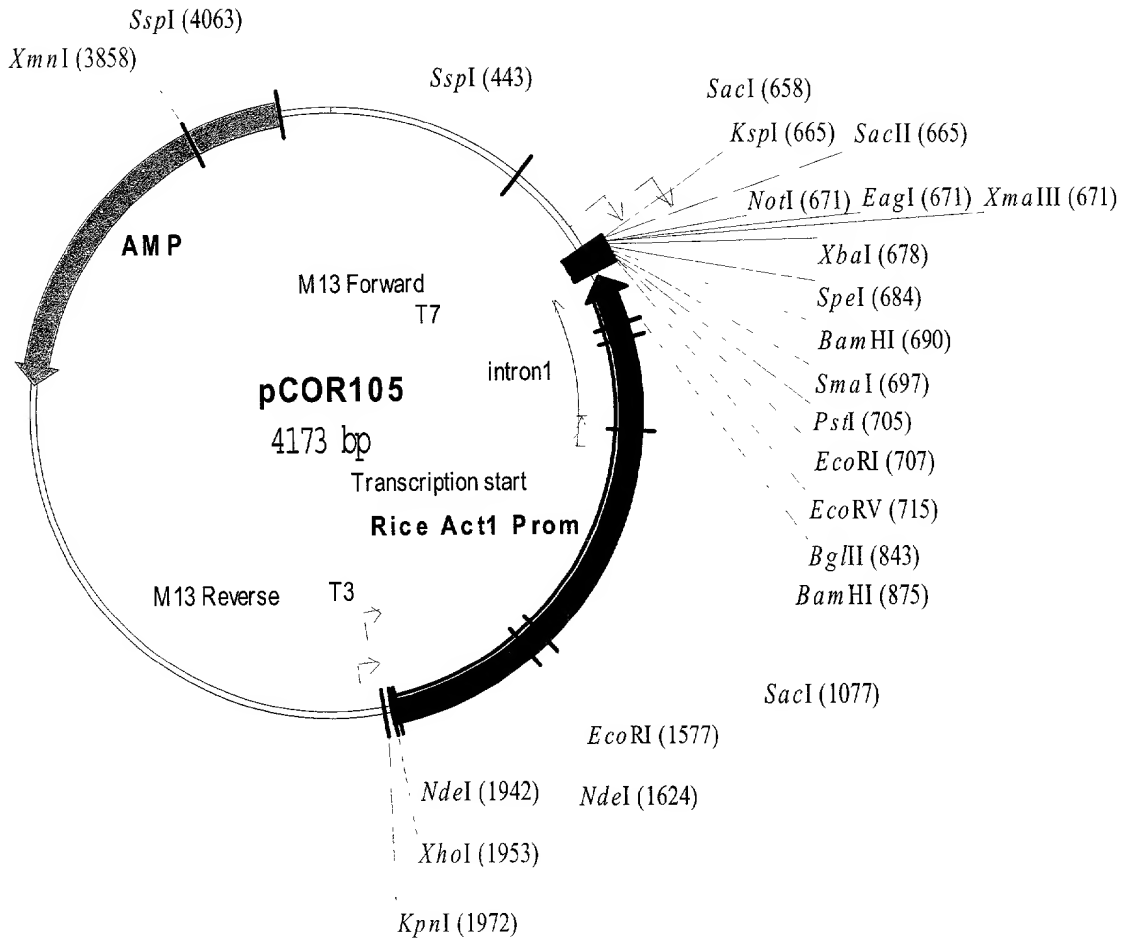

SspI (4063)
XmnI (3858)
SspI (443)
SacI (658)
KspI (665) SacII (665)
NotI (671) EagI (671) XmaIII (671)
XbaI (678)
SpeI (684)
BamHI (690)
SmaI (697)
PstI (705)
EcoRI (707)
EcoRV (715)
BglII (843)
BamHI (875)
SacI (1077)
EcoRI (1577)
NdeI (1624)
NdeI (1942)
XhoI (1953)
KpnI (1972)
AMP
M13 Forward
T7
pCOR105
4173 bp
intron1
Transcription start
Rice Act1 Prom
M13 Reverse
T3

Figure 8

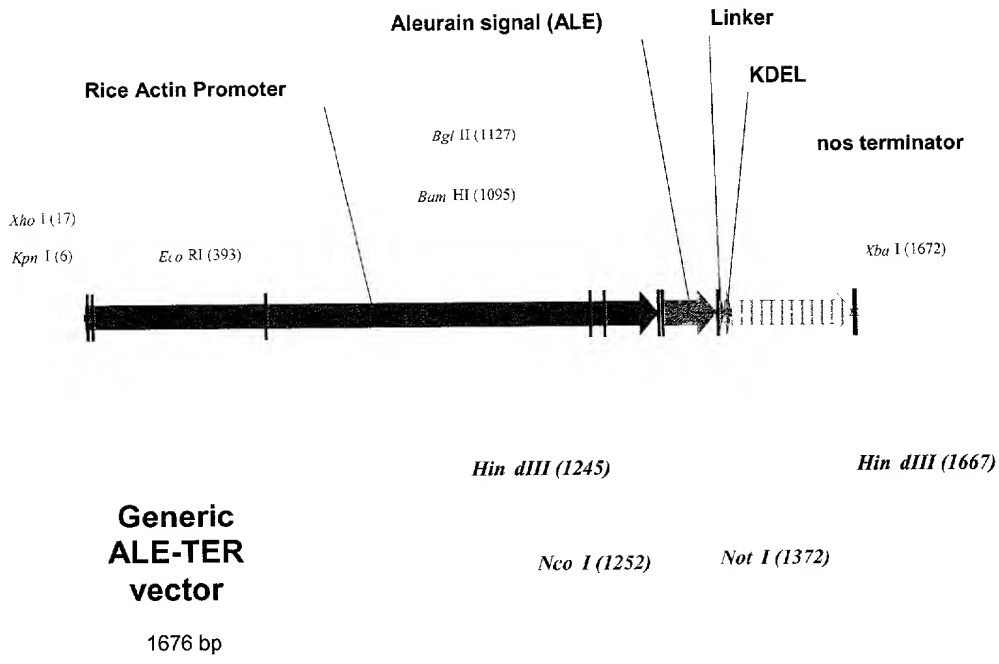

Aleurain signal (ALE)
Linker
KDEL
Rice Actin Promoter
Bgl II (1127)
nos terminator
Bam HI (1095)
Xho I (17)
Kpn I (6)
Eco RI (393)
Xba I (1672)
Hin dIII (1245)
Hin dIII (1667)
Generic
ALE-TER
vector
1676 bp
Nco I (1252)
Not I (1372)

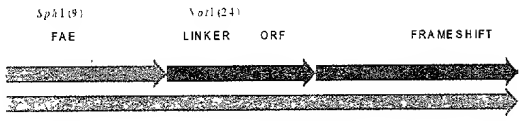
Figure 9

KDEL-COOH ER retention sequence

```
          NotI
        ~~~~~~~~
         A  A  A  K   P  L  K   D  E  L   *
    1   GCGGCCGCGA AACCACTGAA GGATGAGCTG TAA
```

Figure 10

FAE-LINKER-FRAMESHIFT structure and sequence



FAE-LINKER-FRAMESHIFT
48 bp

```
+1  G  A  C  T  W  P  V  A  A  A  E  T  T  E  G
       SphI              NotI
      ~~~~~~            ~~~~~~~~
1  GGCGCATGCA CCTGGCCGGT CGCGGCCGCG GAAACCACTG AAGGATGA
   CCGCGTACGT GGACCGGCCA GCGCCGGCGC CTTTGGTGAC TTCCTACT
```

Plant transformation cassettes

Initial vectors

Original Actin	HS	original Actin + hyg	Target	Actin (+ hyg	H.S. →	See1 →)
TP11.1	TT3	TR 9.4	VAC	UH4	UK3	UB 8.1
TT5	-	TT5.5	APO	UH6	UH12	-
UA4.4	-	-	APO	UH7	UH13	-
TP8.5	-	-	VAC	UH5	UK 6	-
TP3.1	-	TR8 (-glycos)	VAC	HOX3	UC5.1	-
TU4	-	-	VAC/ER	UH3	UK2	-
TU5	-	-	E.R.	UH8	UH10	-
UG	-	-	E.R.	UH9	UH11	-
TP5.1	TT2	TR6.1	E.R.	UF1	UK1	-
TP4	-	TR2	APO	-	-	-
TP3.1			GOLGI	pJQ4.9 *	-	-
TP3.1			APO	pJQ3.2 *	-	pJQ5.2
TP3.1			VAC	pJ06.3 *	-	-

* - Modified actin promoter (Kpn1-EcoR1 deletion and restored NCO site)

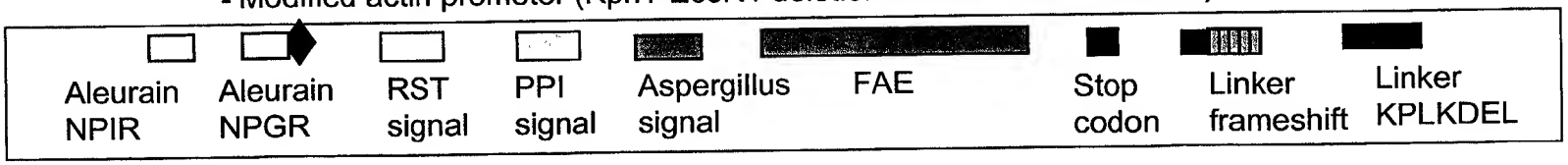


Figure 11

Vectors

Original Actin promoter in pCOR105

	Target	Signal sequences	Vectors
(i)	APO	- aleurain-NPGR-FAE	pUH6, pTT5, TT5.5, pTT5.1
		- aleurain-delNPIR -FAE	pUH7, pUA4.4,
(ii)	ER	- aleurain-NPGR-FAE-linker-KDEL	pTU5, pUH8,
		- aleurain-delNPIR-FAE-linker-KDEL	pUG4, pUH9,
(iii)	VAC	- aleurain-NPIR-FAE	pTP11.1, pTR9.4, pUH4, pUK3,
(iv)	ER/VAC	- aleurain-NPIR-FAE-linker-KDEL	pTU4, pUH3,
(v)	VAC	- aleurain-NPIR-FAE-linker-frameshift	pUA1K3, pTP3.1, pUC5.11
(vi)	VAC	- aleurain-NPIR-FAE-linker-stop	pTP8.5, pUH5
(vii)	ER	- Aspergillus signal -FAE-KDEL	pTP5.1, pTP6.1, pUF1,

Modified actin promoter (Kpn1-EcoR1 deletion and restored NCO site)

(i)	VAC	- aleurain-NPIR-FAE-linker-frameshift	pJ06.3
(ii)	GOLGI	- RST-FAE-linker-frameshift	pJQ3.2
(iii)	APO	- PPI-FAE-linker-frameshift	pJQ4.9

Heat-shock promoter

(i)	APO	- aleurain-NPGR-FAE	pUH12
		- aleurain-delNPIR-FAE	pUH13
		- Aspergillus signal-FAE	pTP4a2, pTR2.22,
(ii)	ER	- aleurain-NPGR-FAE-linker-KDEL	pUH10
		- aleurain-delNPIR-FAE-linker-KDEL	pUH11
(iii)	VAC	- aleurain-NPIR -FAE	pUK3,pTT3
(iv)	ER/VAC	- aleurain-NPIR-FAE-linker-KDEL	pUK2
(v)	VAC	- aleurain-NPIR-FAE-linker-frameshift	pUC5.11, pHOX3
(vi)	VAC	- aleurain-NPIR-FAE-linker-stop	pUK6
(vii)	ER	- Aspergillus signal -FAE-KDEL	pUK1, pTT2

Senescence promoter

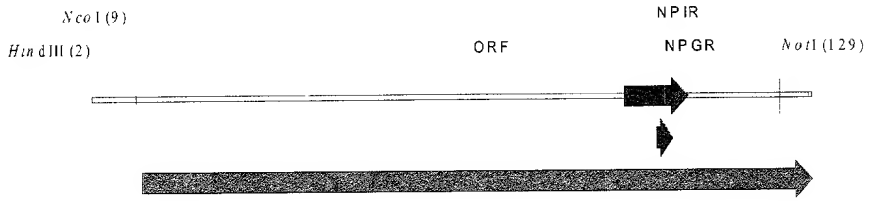
(i)	APO	- See1-PPI-FAE-linker-frameshift	pJQ5.2
(ii)	VAC	- See1-aleurain-deleted NPIR-FAE	pUB8.1

Figure 12

Figure 13

ALEURAIN -NPIR (Vacuolar) and NPGR (Apoplast) structure and sequence

NPIR UNDERLINE
NPGR BOLD



ALEURAIN-NPIR
134 bp

```
+1          M  A  H  A  R  V  L  L  L  A  L  A  V  L  A  T  A  A  V  A
   HindIII NcoI
   ~~~~~~ ~~~~~~~
1  AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG
   TTCGAATGGT ACCGGGTGCG GGCGCAGGAG GAGGACCGCG AGCGGCACGA CCGGTGCCGG CGGCAGCGGC

+1 V  A  S  S  S  S  F  A  D  S  N  P  I  R  P  V  T  D  R  A  A
                                                        NotI
                                                        ~~~~~~~~
71 TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGC
   AGCGGAGGAG GAGGAGGAAG CGGCTGAGGT TGGGCTAGGC CGGGCAGTGG CTGGCGCGCC GGCG
```

Figure 14

RAT SIALYL TRANSFERASE Golgi signal sequence

```
        HindIII
        ~~~~~~
                  M   I   H   T   N   L   K   K   K   F   S   L   F   I   L   V   F   L   L   F   A
  1     AAGCTTACCA TGATCCACAC CAACCTCAAA AAGAAGTTCT CCCTCTTCAT CCTCGTCTTC CTCCTCTTCG

        ·  V   I   C   V   W   K   K   G   S   D   Y   E   A   L   T   L   Q   A   K   E   F   Q   M  ·
 71     CCGTGATCTG CGTGTGGAAG AAGGGCTCCG ACTACGAGGC CCTCACCCTC CAAGCCAAGG AGTTCCAAAT

           NotI
         ~~~~~~~~
        · A   A
141     GGCGGCCGC
```

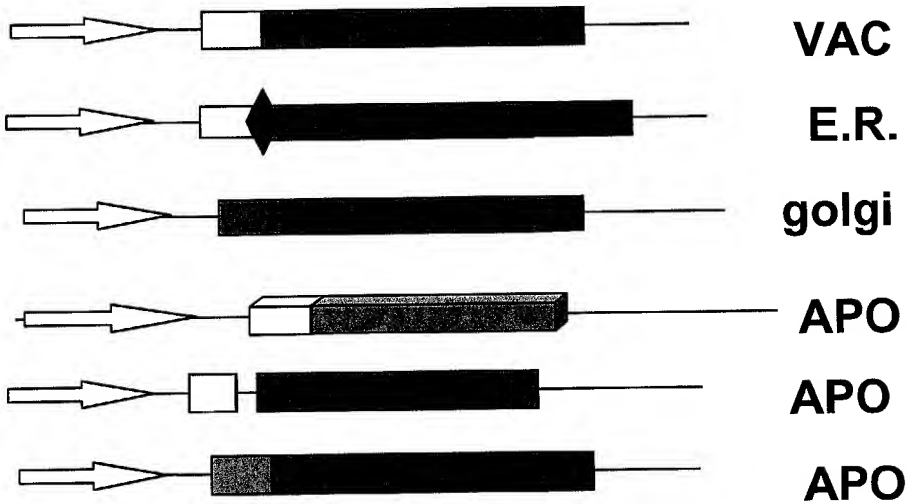
Figure 15

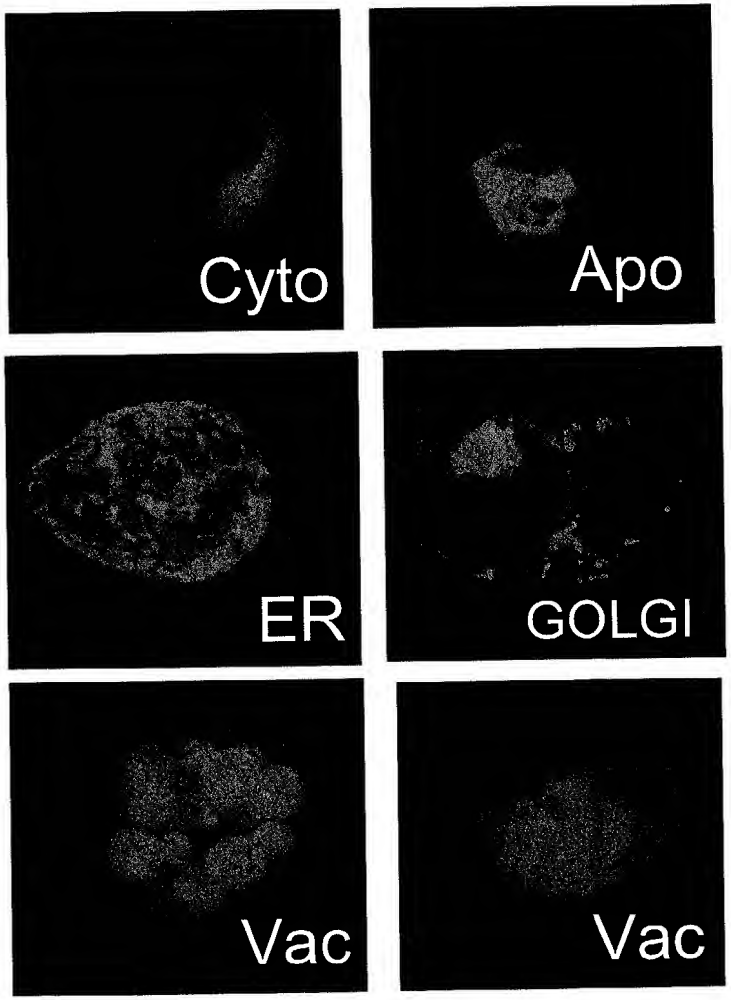
POTATO PROTEASE INHIBITOR II Apoplast signal sequence

```
        HindIII
        ~~~~~~
                  M   X   V   H   K   E   V   N   F   V   A   Y   L   L   I   V   L   G   L   L   L
  1     AAGCTTACMA TGGMCGTGCA CAAGGAGGTS AACTTCGTSG CCTACCTCCT GATCGTSCTC
        GGCCTCCTCT
                        NcoI
                        ~~~~~~~
        ·   L   V   S   A   M   E   H   V   D   A   K   A   C   T   X   E   C   G   N   L
        G   F   G   ·
 71     TGCTCGTSTC CGCCATGGAG CACGTGGACG CCAAGGCCTG CACCCKCGAG TGCGGCAACC
        TCGGCTTCGG
                      NotI
                      ~~~~~~~~
        ·   I   C   P   A   A   A
141     CATCTGCCCG GCGGCCGCC
```

Targeting expression of gfp to different cell compartments

Actin promoter targeting vectors





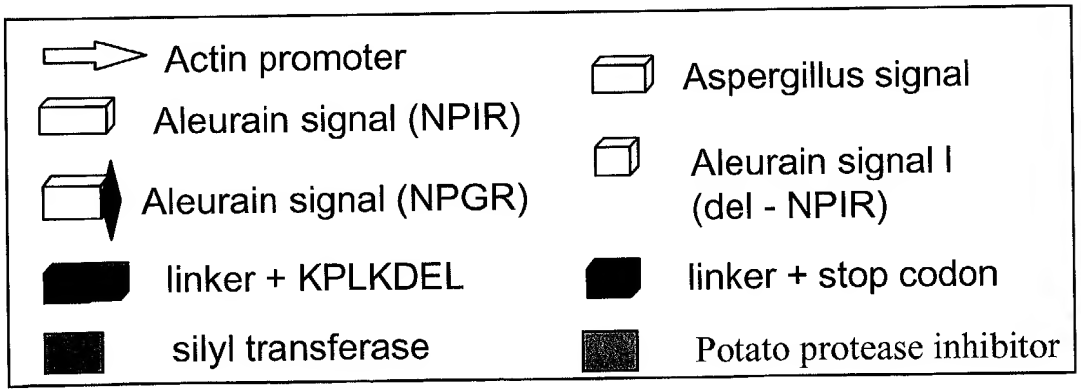
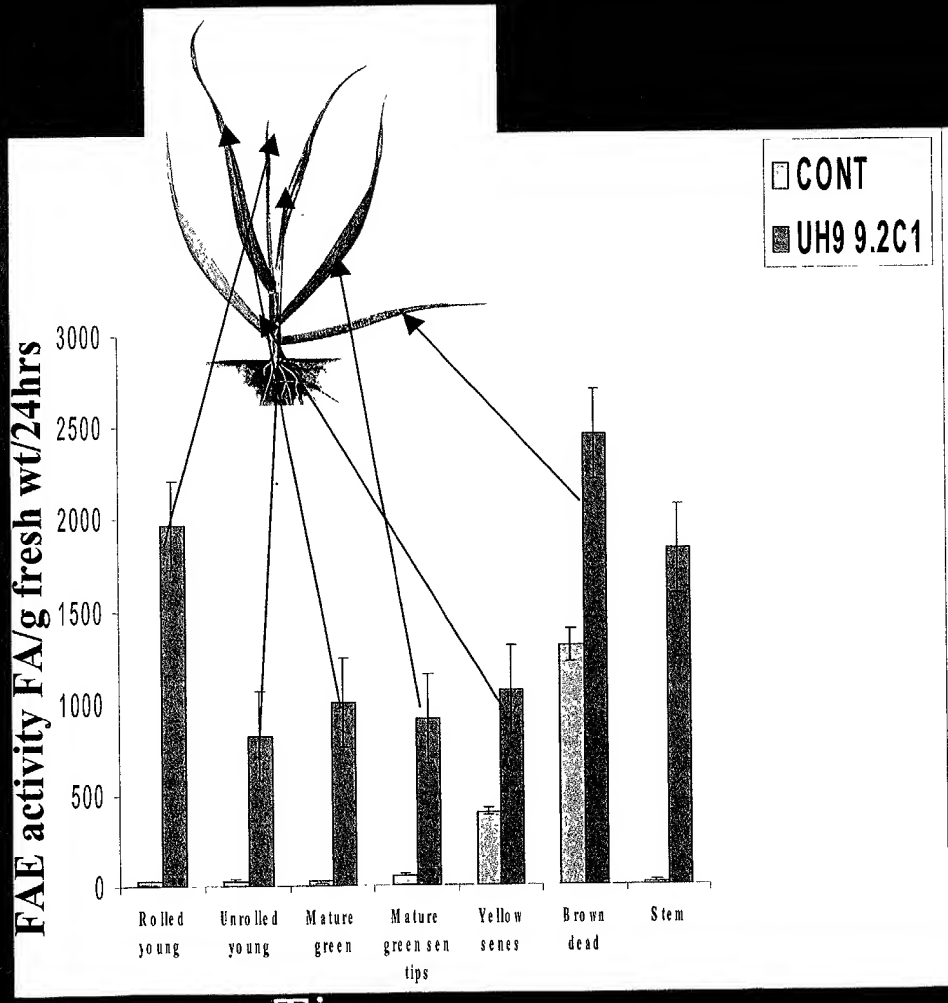


Figure 16

FAE activity in transgenic *Festuca arundinacea* leaves of different ages under ER and APO targeting sequence.



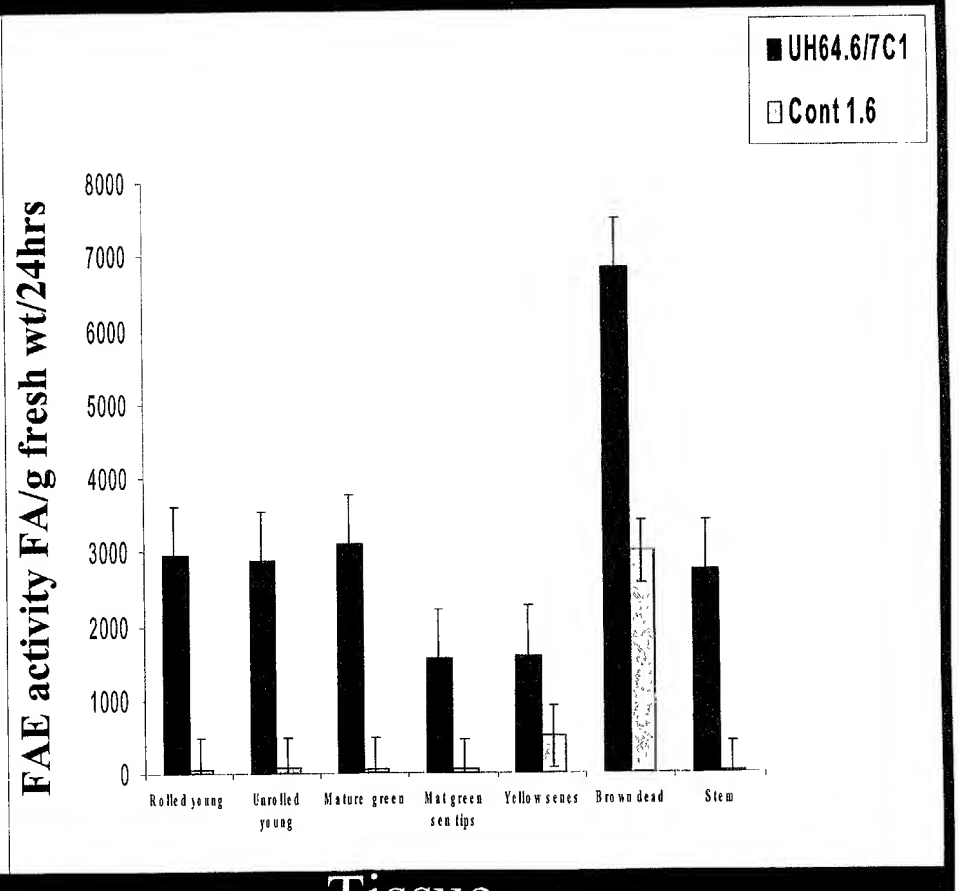


Figure 17

FAE activity in leaves of primary transformants of *Festuca arundinacea* under Vac targeting sequence

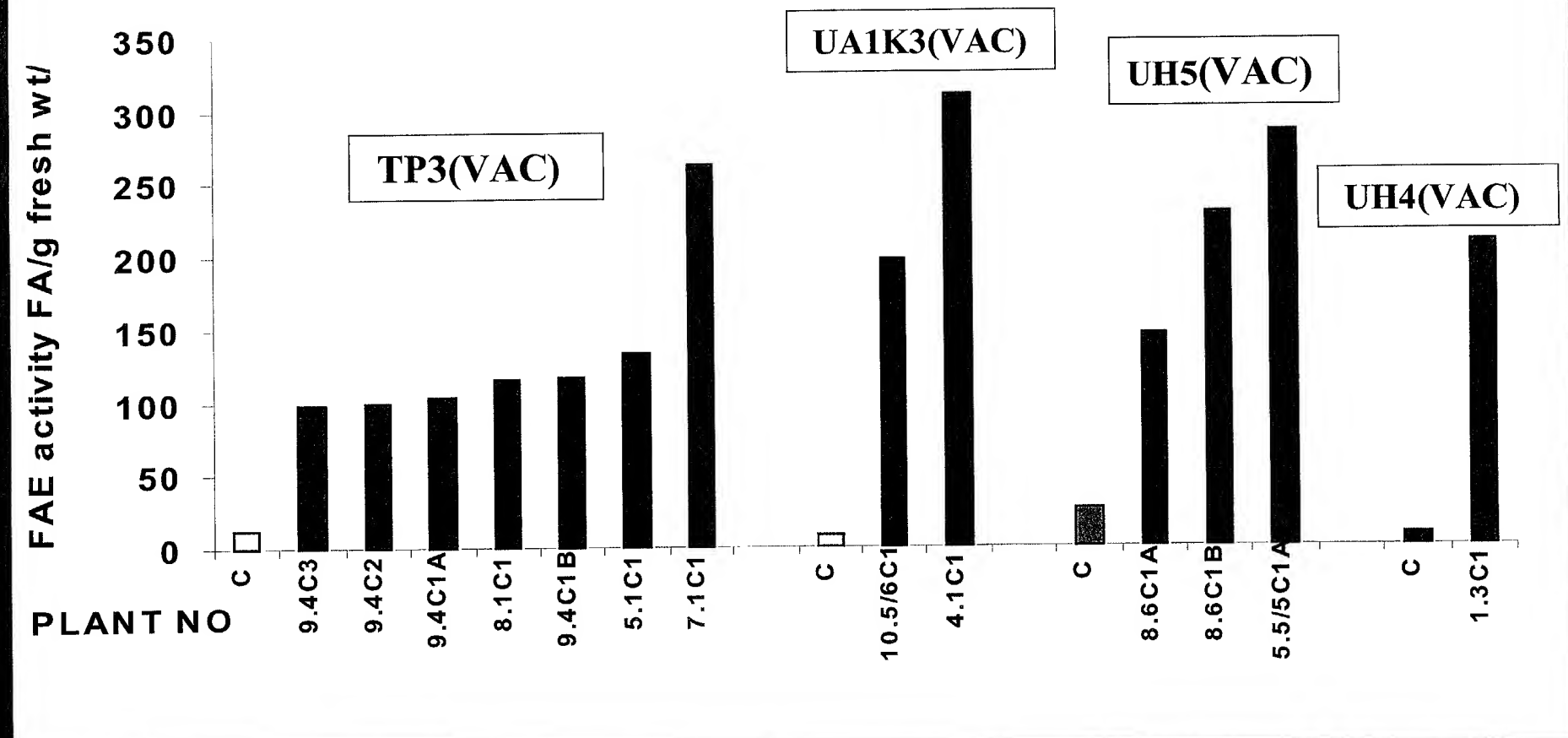


Figure 18

E214

FAE activity in *Lolium mutiflorum* leaves of different ages

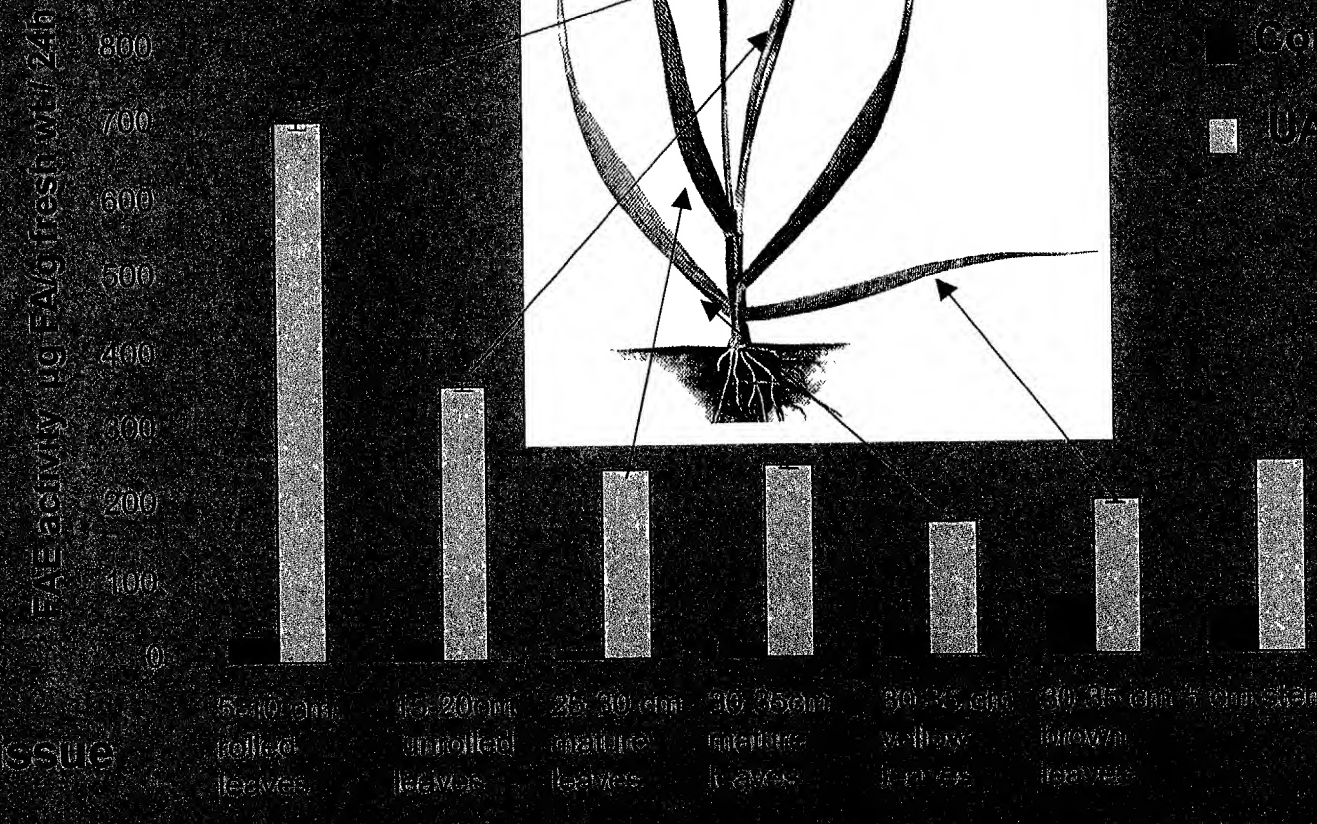
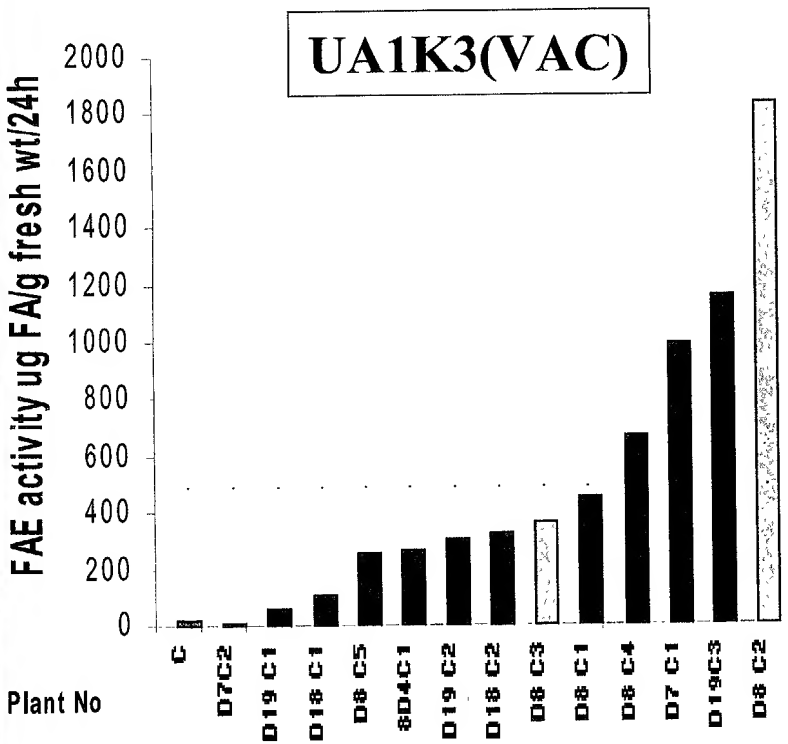


Figure 19

FAE activity in leaves of primary transformants of *Lolium multiflorum* under VAC APO and ER targeting sequence.



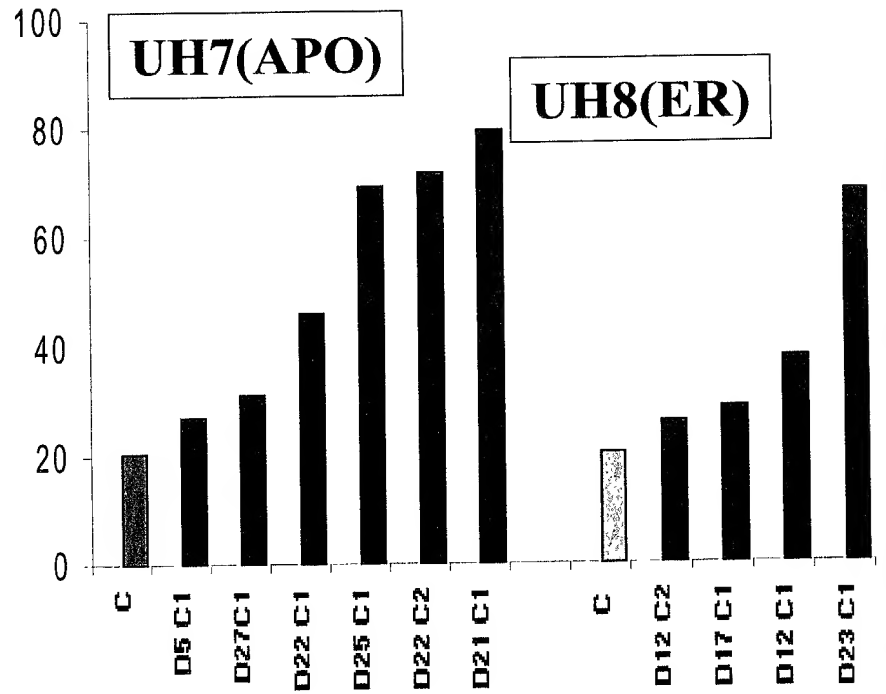


Figure 20

Levels of esterified monomeric and dimeric hydroxycinnamicacids in *Festuca arundinacea* plants expressing FAE under VAC targeting sequence.

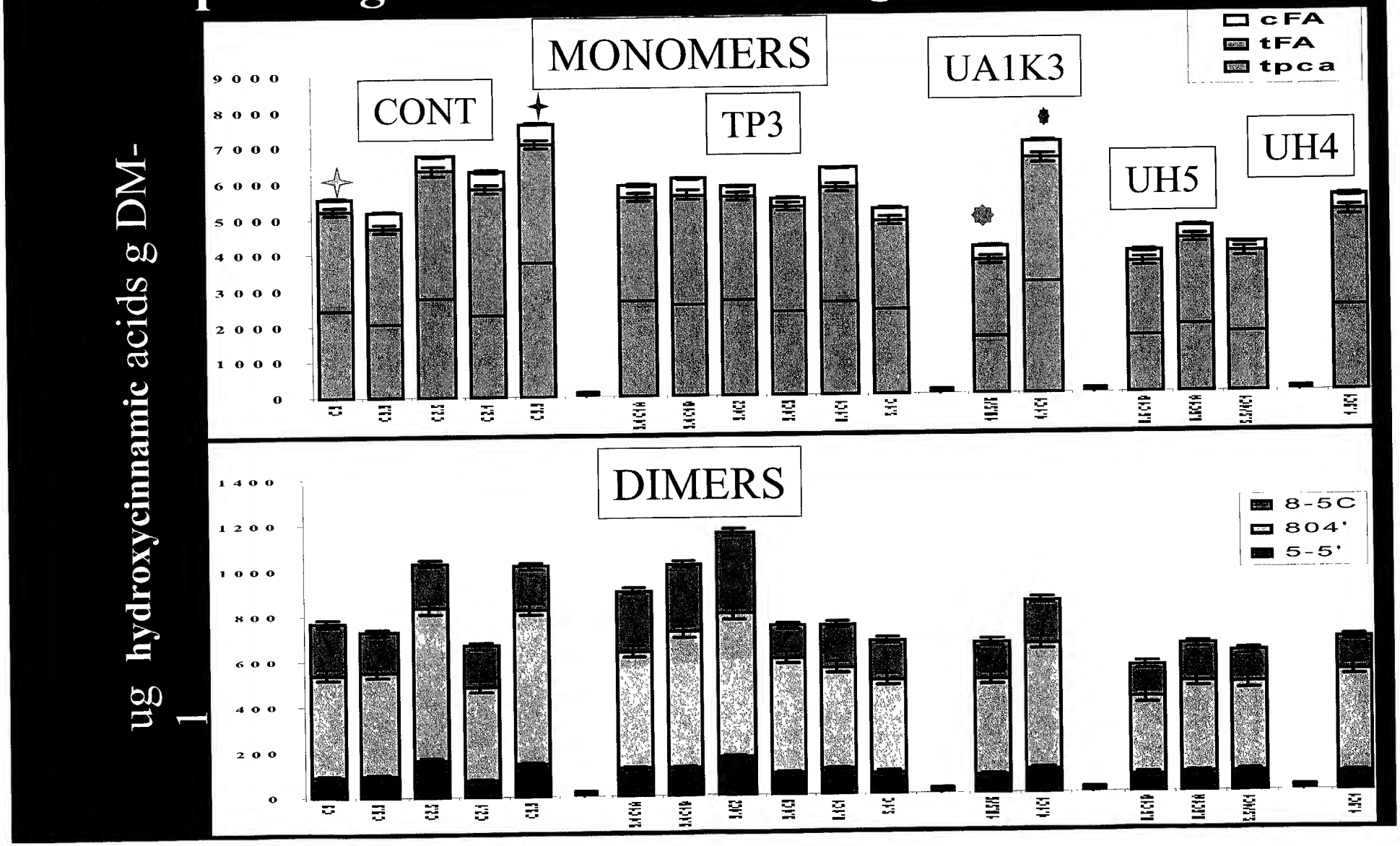


Figure 21

Levels of esterified monomeric and dimeric hydroxycinnamic acids in leaves of *F.a.* expressing FAE under ER and APO targeting

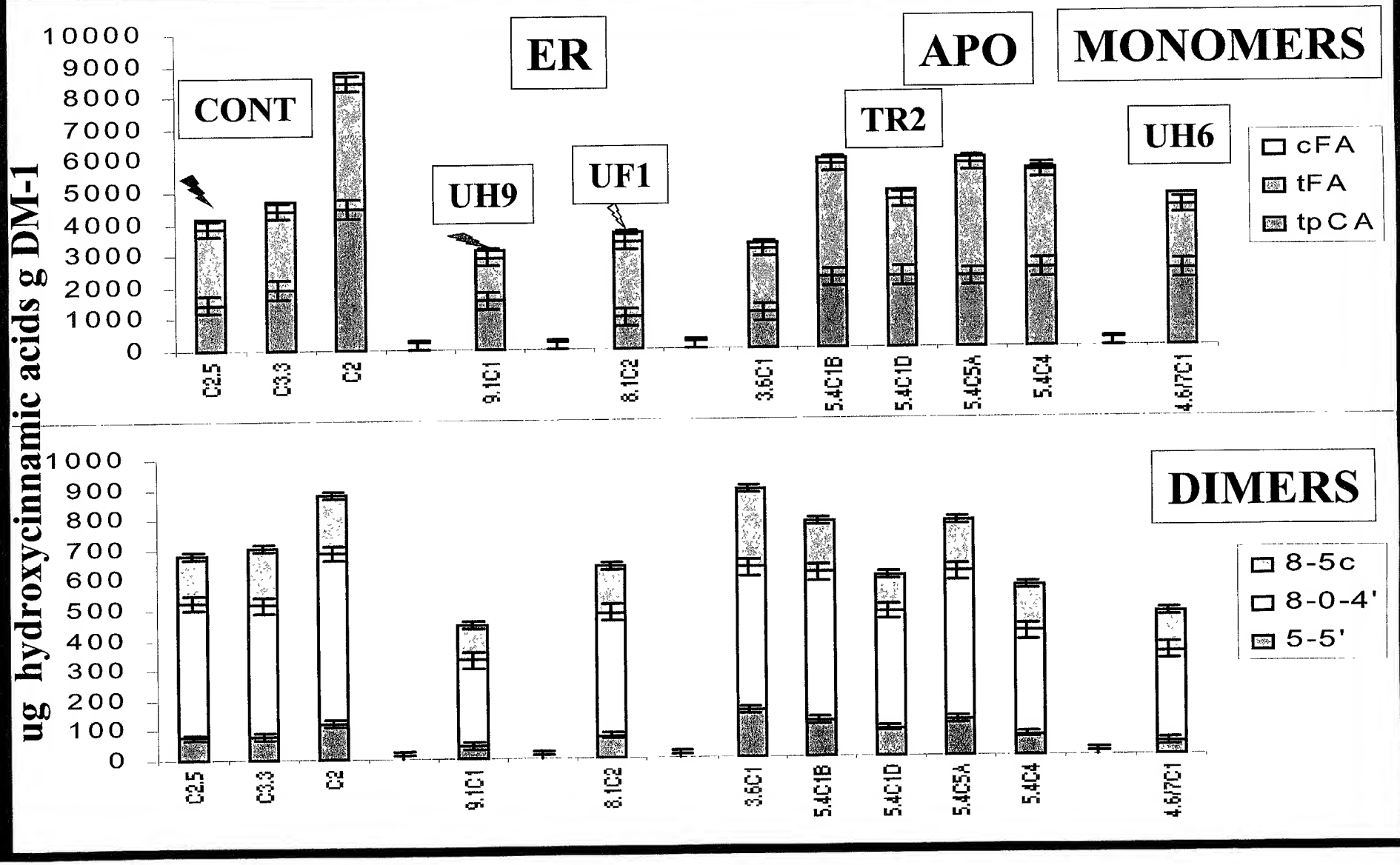
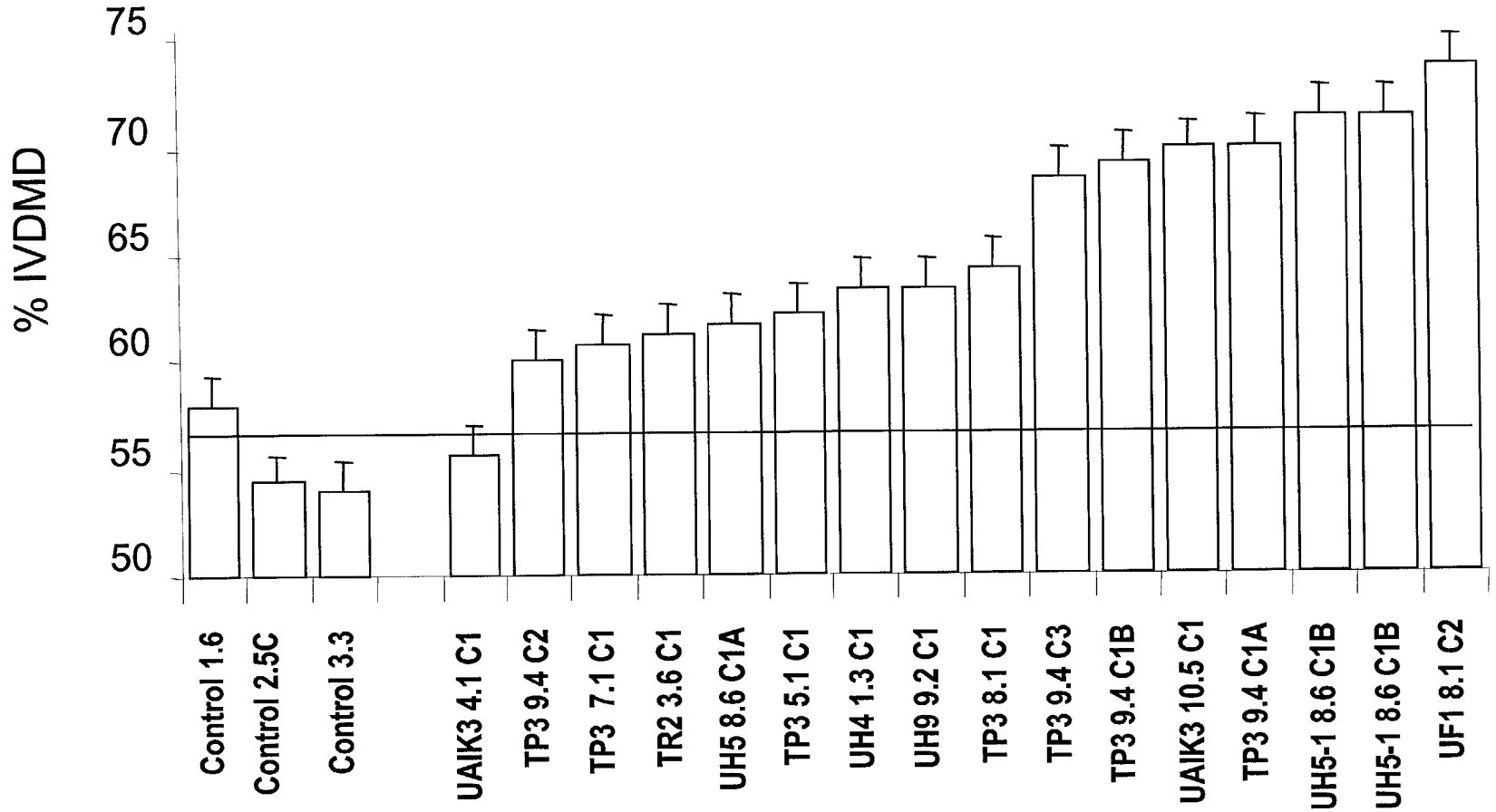


Figure 22

In vitro dry mater digestibility of leaf tissue of mature *Festuca arundinacea* plants expressing FAE under an actin promoter

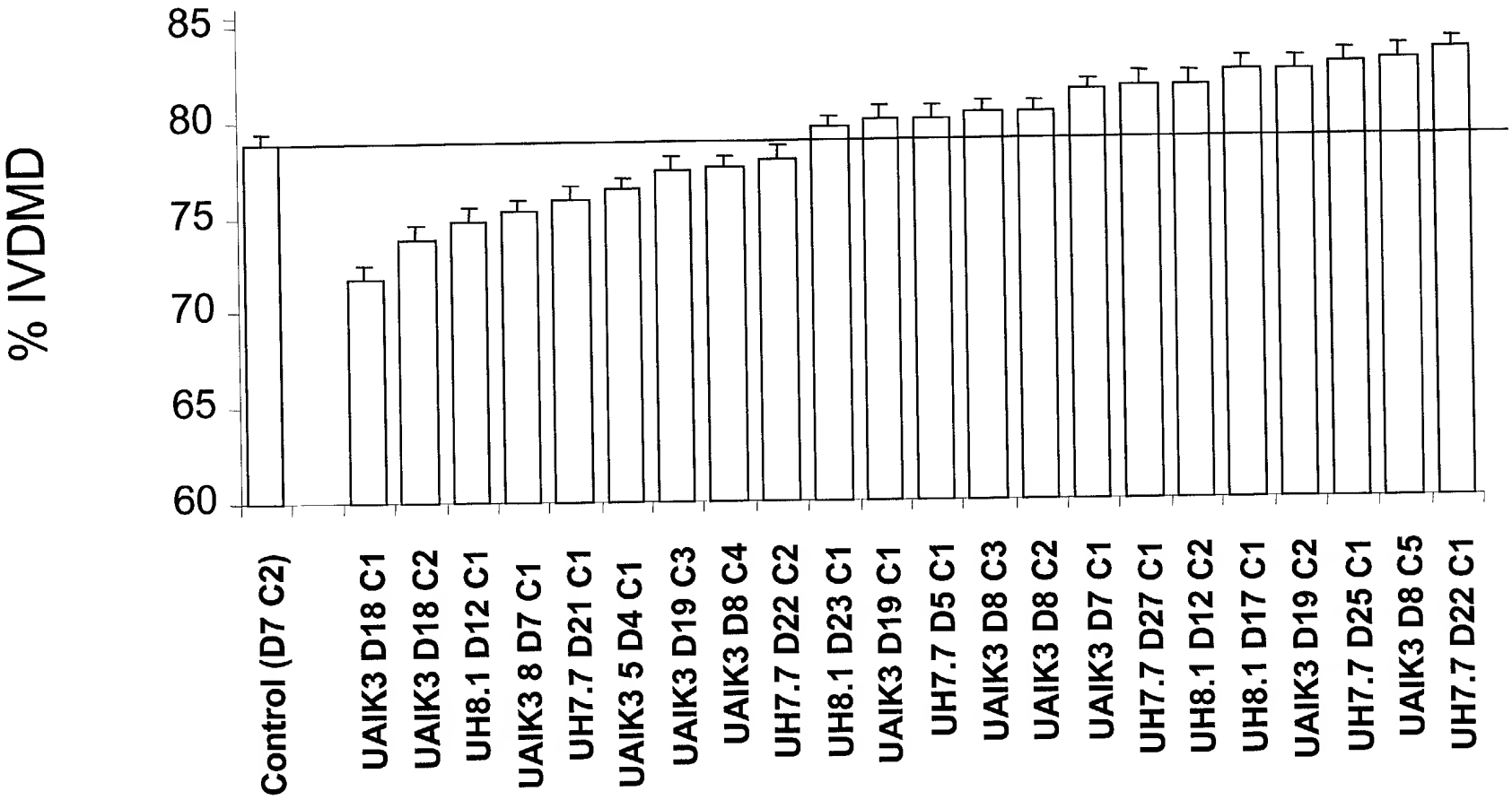


UA1K3* - VAC (Alu-FAE-linker-frameshift)	TP3-VAC (Alu-FAE-linker frameshift)	TR2-APO (Asp-FAE)	UH5* -VAC (Alu-FAE-linker-stop	UH4* -VAC (Alu-FAE + CaMV-Hyg)	UH9* - ER (Alu-delNPIR-linker-KDEL	UF1* -ER (Asp-FAE-linker -KDEL)

* co-integration vector

Figure 23

In vitro dry mater digestibility of leaf tissue of mature Lolium multiflorum plants expressing FAE under an actin promoter



UA1K3* - VAC (Alu-FAE-linker-frameshift)	UH8*-ER (Alu-NPGR-FAE -KDEL)	UH7*-APO (Alu-del NPIR-FAE)

* co-integration vector

Figure 24

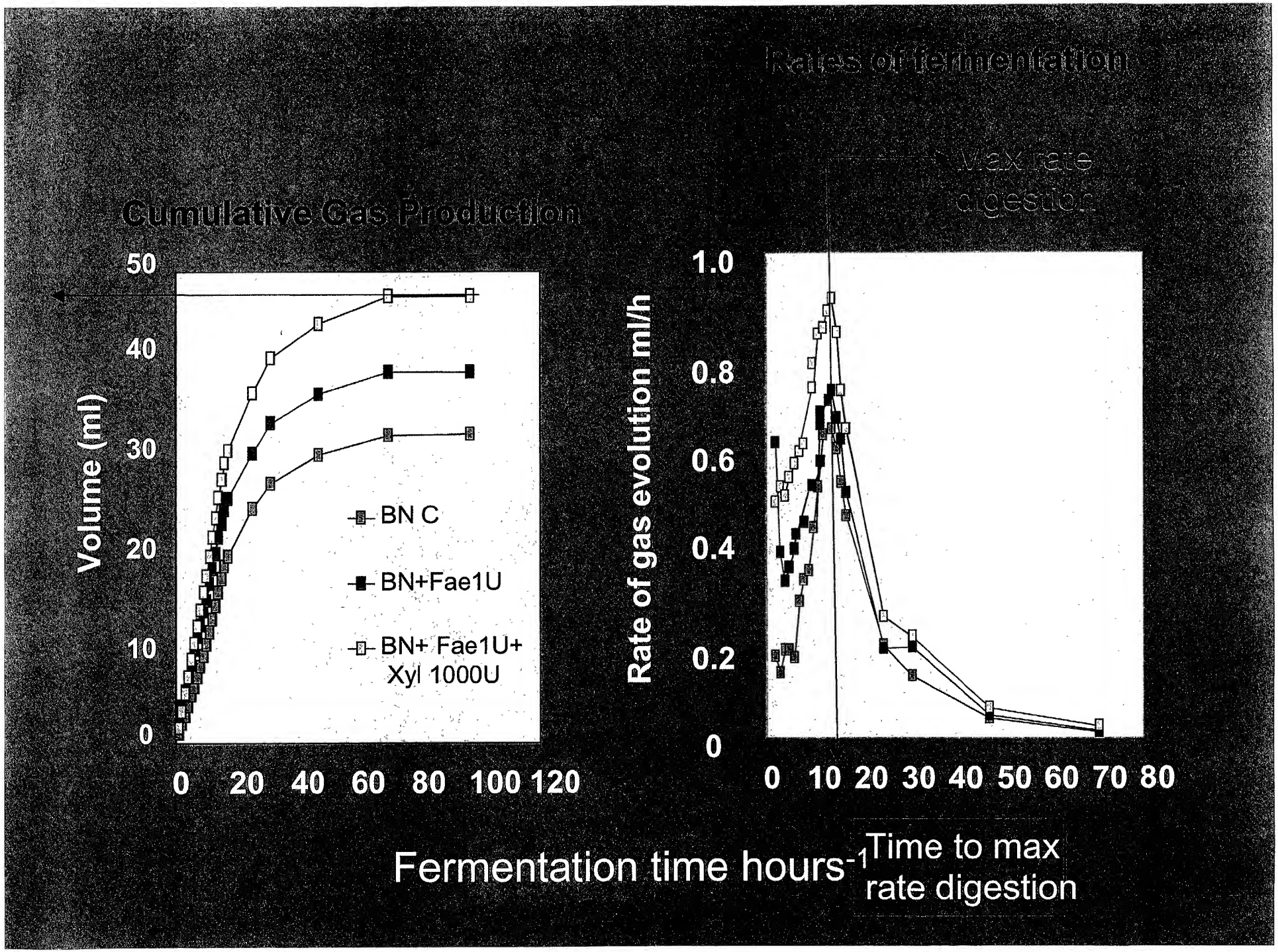

Rates of fermentation
Max rate
digestion
Cumulative Gas Production
Volume (ml)
50
40
30
20
10
0
0 20 40 60 80 100 120
BN C
BN+Fae1U
BN+ Fae1U+
Xyl 1000U
Rate of gas evolution ml/h
1.0
0.8
0.6
0.4
0.2
0
0 10 20 30 40 50 60 70 80
Fermentation time hours
Time to max
rate digestion

Figure 25

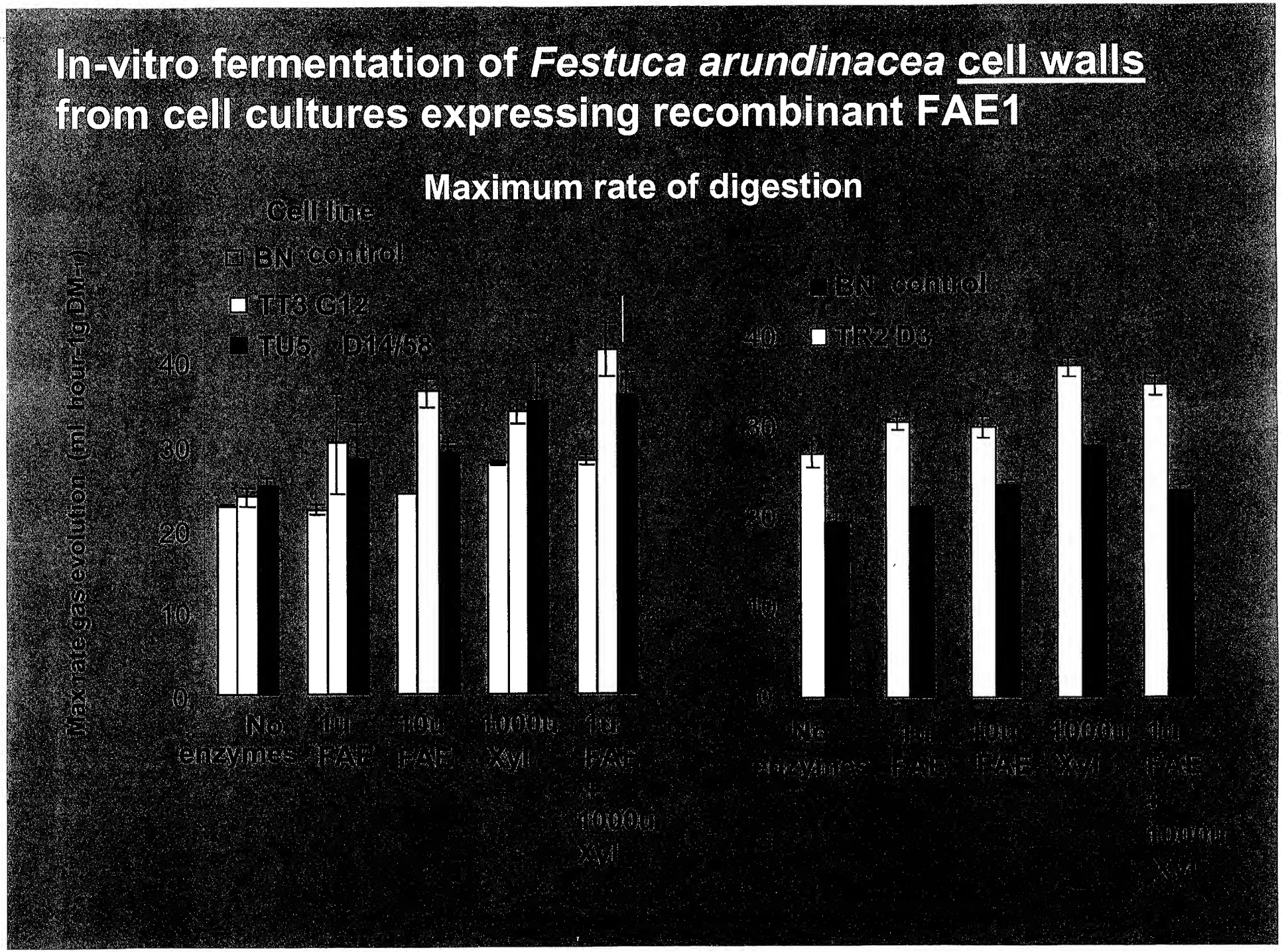

In-vitro fermentation of Festuca arundinacea cell walls from cell cultures expressing recombinant FAE1
Maximum rate of digestion
Cell line
BN control
TT3 G12
TU5 D14/58
TR2 D3
Max rate gas evolution (ml hour-1g DM-1)
0
10
20
30
40
No enzymes
1u FAE
10u FAE
1000u Xyl
1u FAE + 1000u Xyl
10u FAE + 1000u Xyl

Figure 26

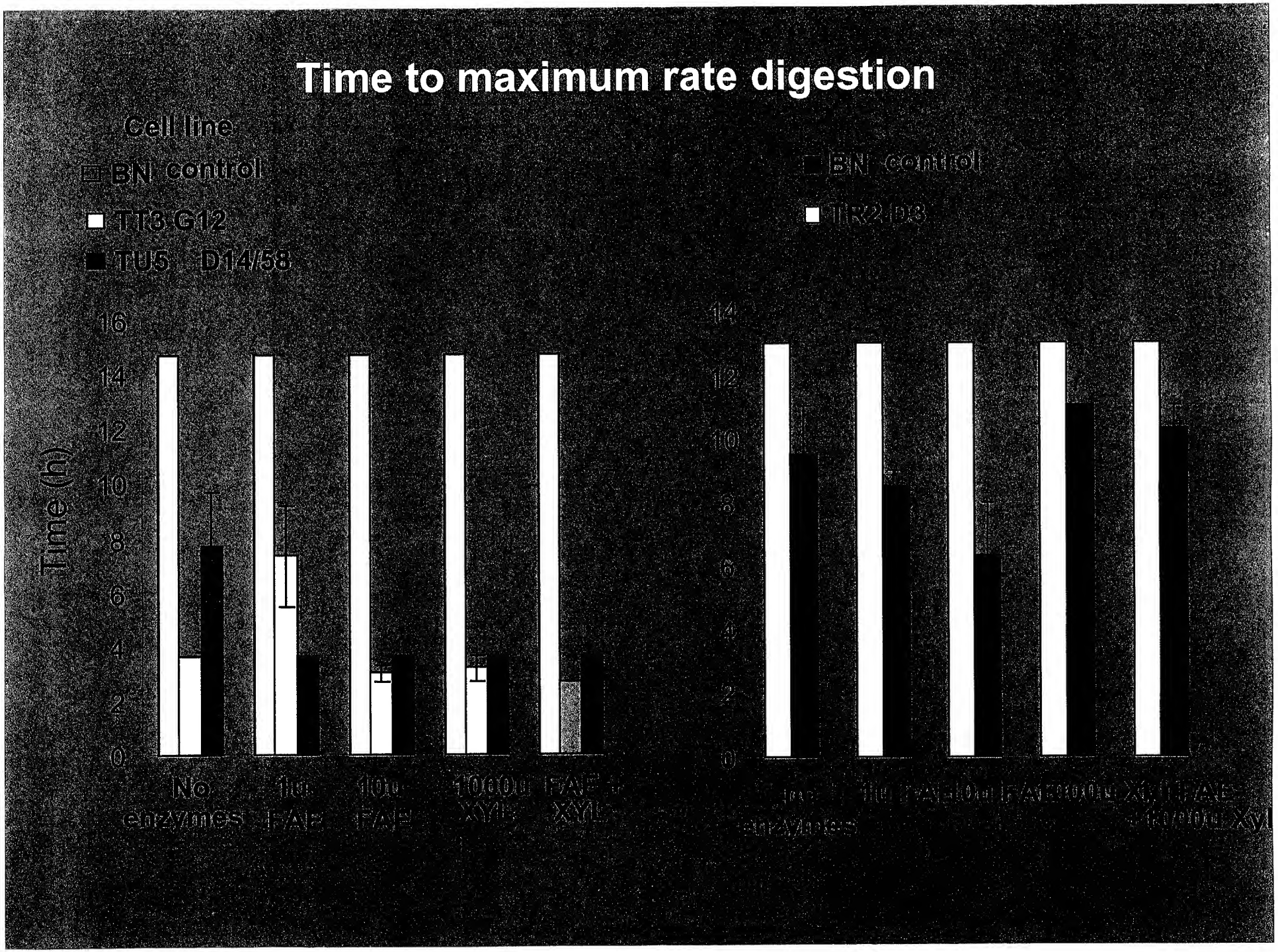

Time to maximum rate digestion
Cell line
BN control
TT8.G12
TU5 D14/58
BN control
TR2.D3
Time (h)
16
14
12
10
8
6
4
2
0
No enzymes
1u FAE
10u FAE
1000u XYL
FAE XYL
14
12
10
8
6
4
2
0
1u FAE
10u FAE
1000u XYL

Figure 27

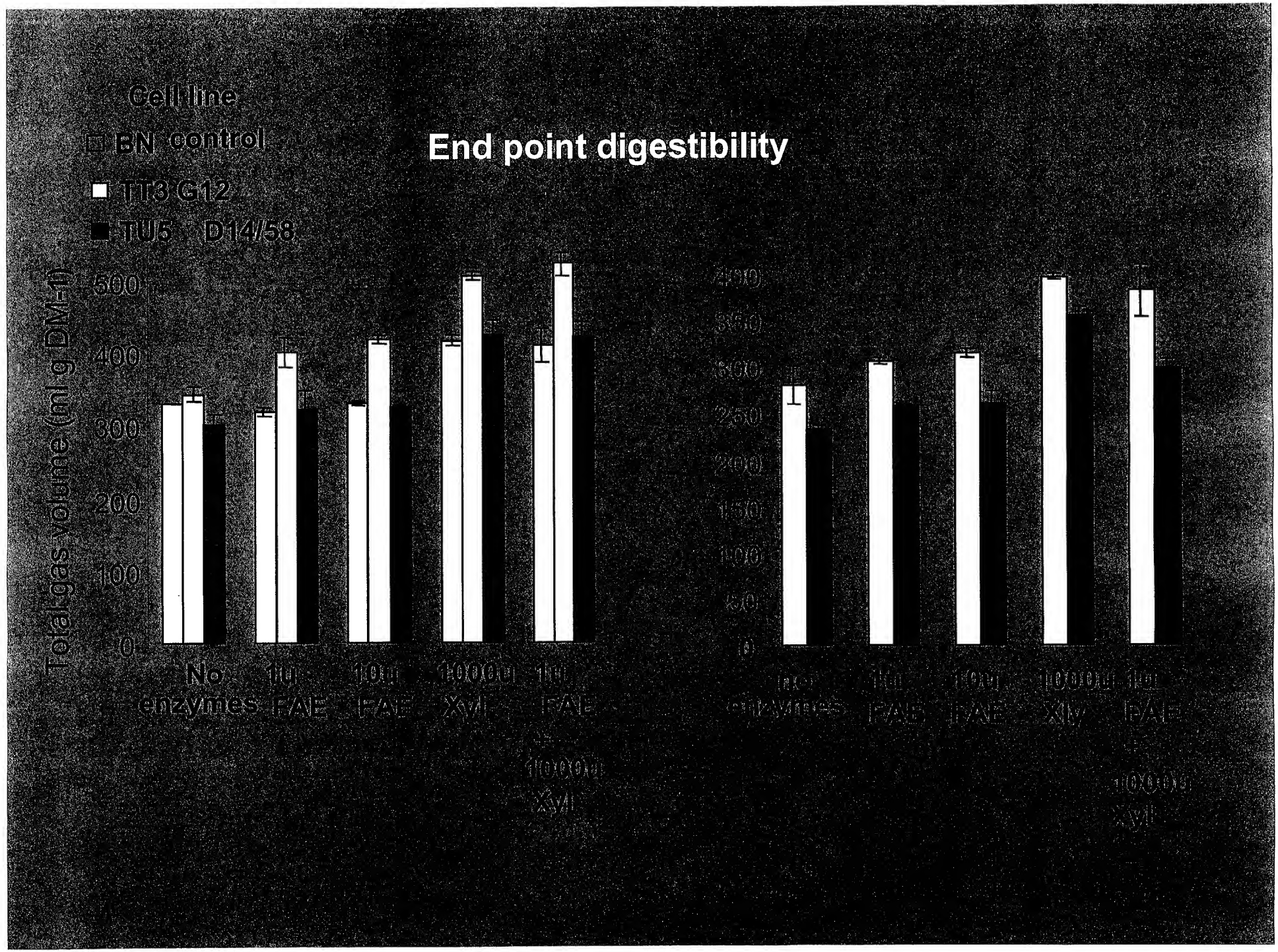

End point digestibility
Cell line
BN control
TT3 G12
TU5 D14/58
Total gas volume (ml g DM-1)
500
400
300
200
100
0
No enzymes
1u FAE
10u FAE
1000u Xyl
1u FAE 1000u Xyl
400
350
300
250
200
150
100
50
0
no enzymes
1u FAE
10u FAE
1000u Xly
1u FAE 1000u Xyl

Figure 28

Kinetics of FAE activity by ferulic acid release from cell wall under self digestion in *Festuca arundinacea* and stimulation by Xylanase.

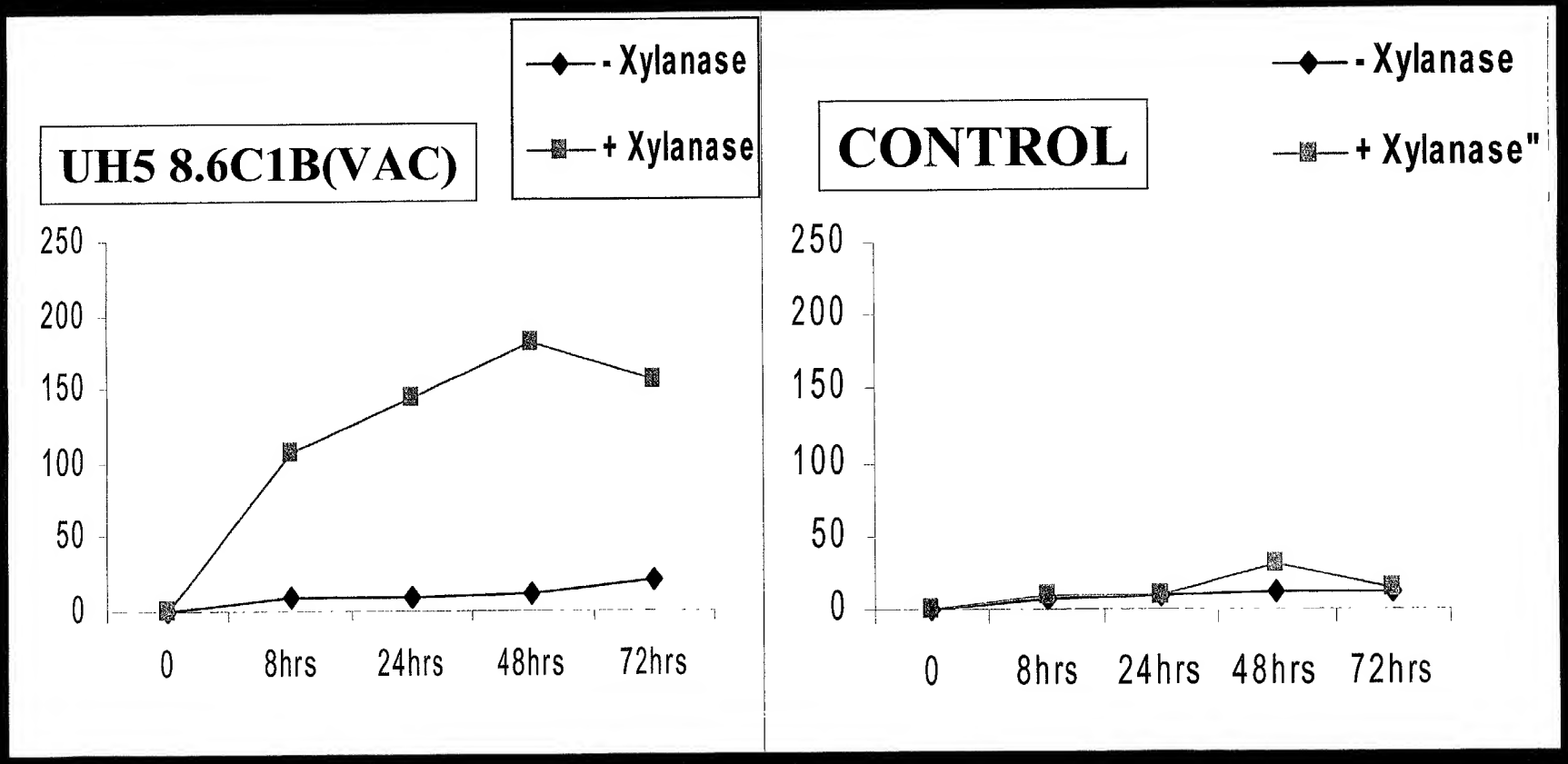


Figure 29

GUS activity under the Lolium See1 senescence promoter in leaves of transgenic plants of *Lolium multiflorum*

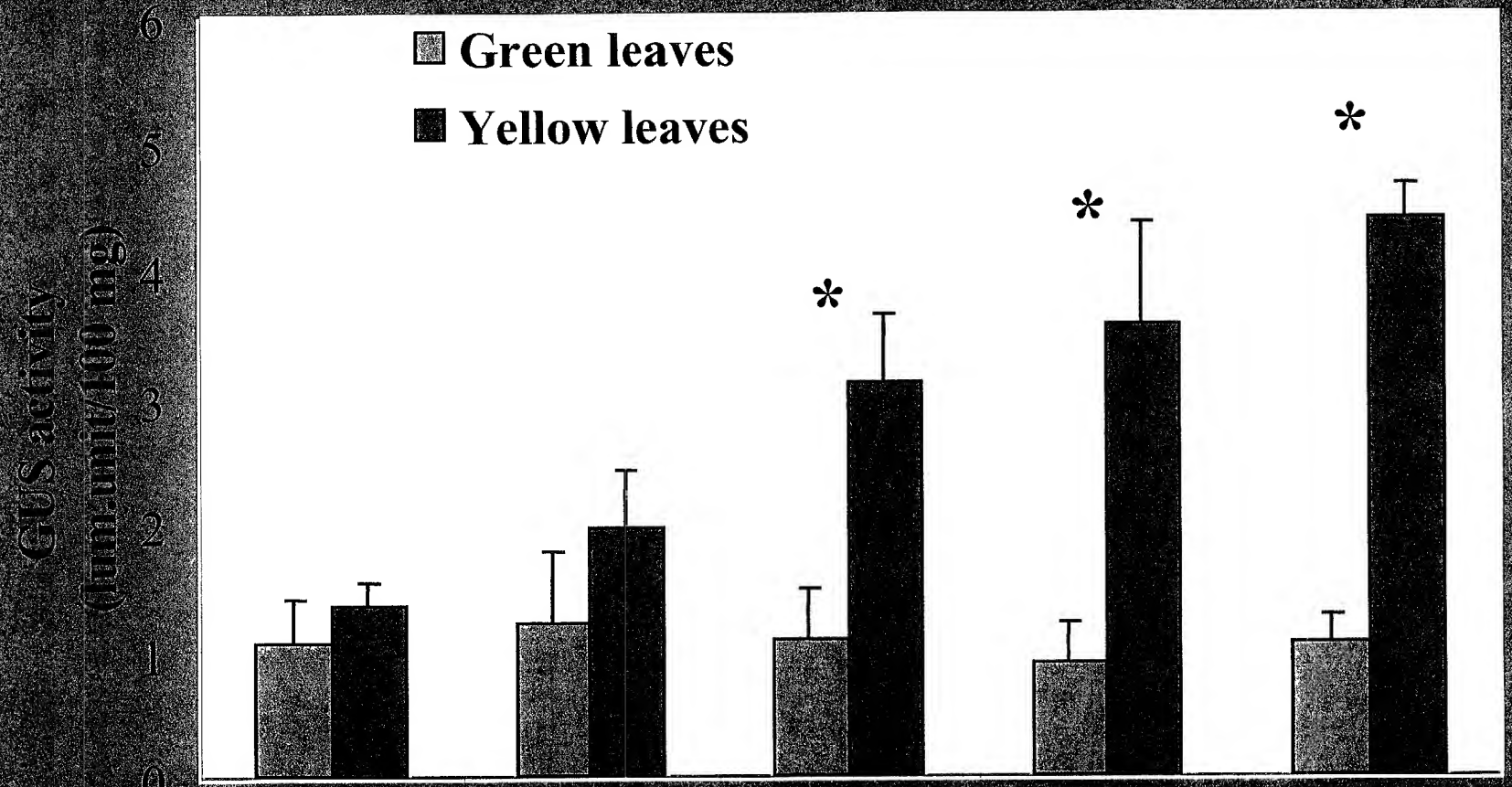


Figure 30

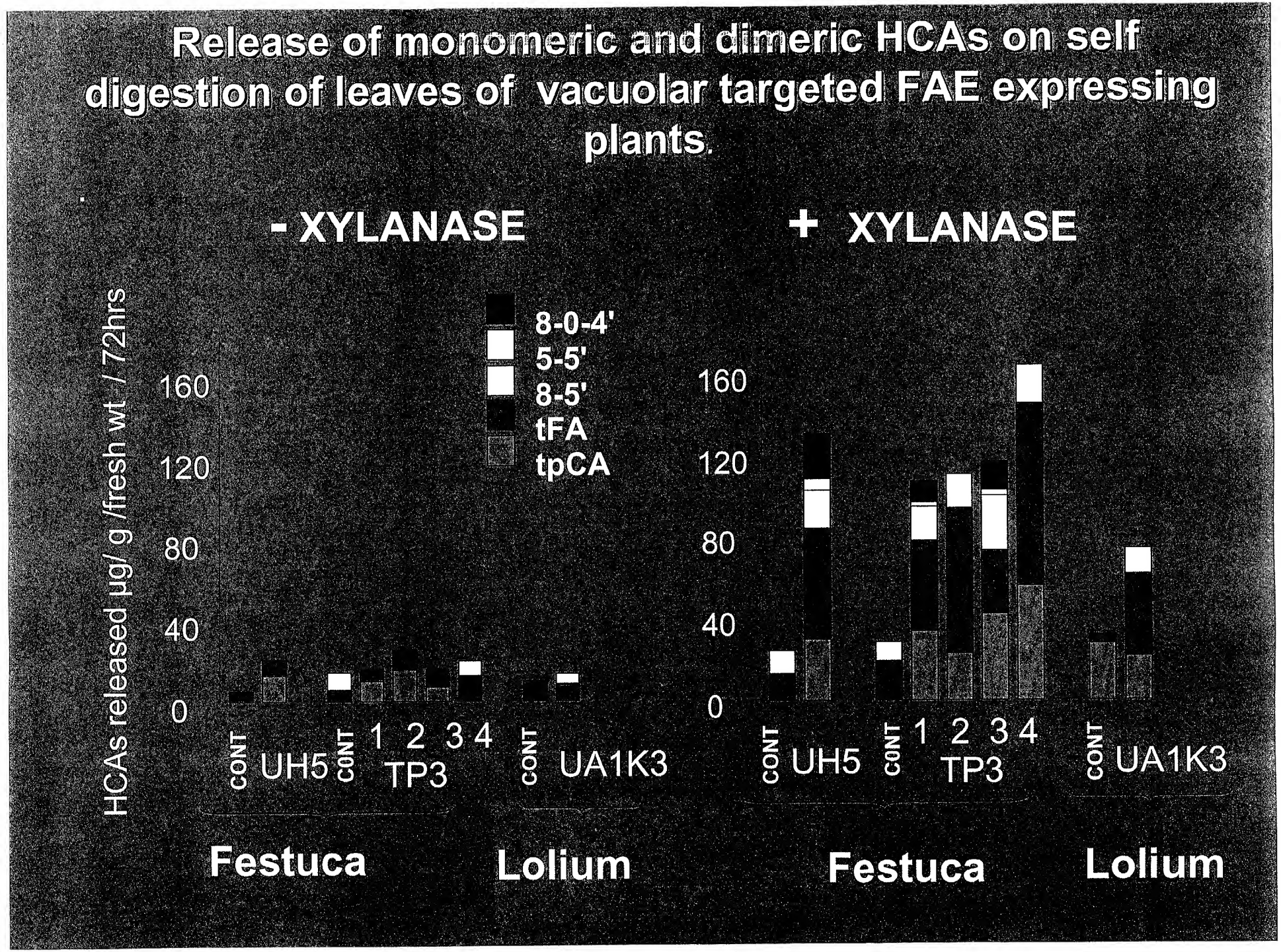

Release of monomeric and dimeric HCAs on self digestion of leaves of vacuolar targeted FAE expressing plants.
- XYLANASE
+ XYLANASE
HCAs released µg/ g /fresh wt / 72hrs
8-0-4'
5-5'
8-5'
tFA
tpCA
160
120
80
40
0
CONT
UH5
CONT
1 2 3 4
TP3
CONT
UA1K3
Festuca
Lolium
Festuca
Lolium

Figure 31

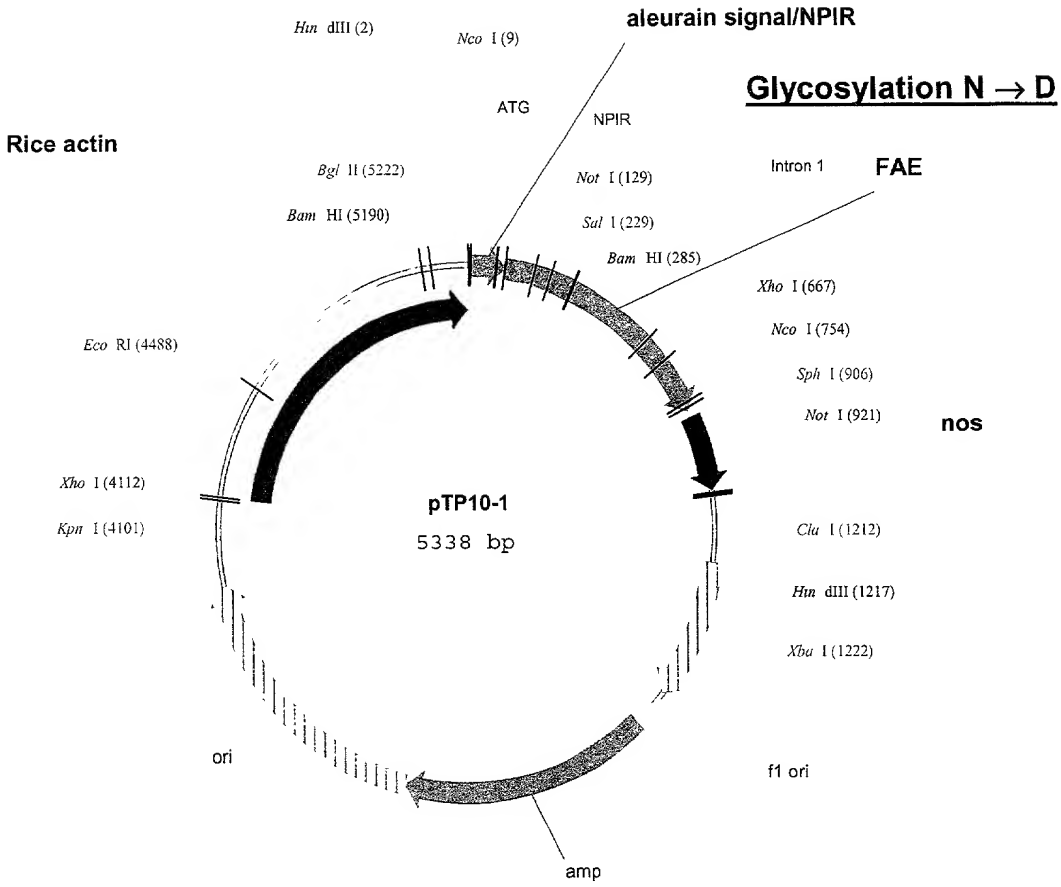

Hin dIII (2)
Nco I (9)
aleurain signal/NPIR
Glycosylation N → D
ATG
NPIR
Rice actin
Bgl II (5222)
Not I (129)
Intron 1
FAE
Bam HI (5190)
Sal I (229)
Bam HI (285)
Xho I (667)
Eco RI (4488)
Nco I (754)
Sph I (906)
Not I (921)
nos
Xho I (4112)
pTP10-1
5338 bp
Kpn I (4101)
Cla I (1212)
Hin dIII (1217)
Xba I (1222)
ori
f1 ori
amp

Figure 32A

Figure 32B

```
                NcoI
               ~~~~~~~
      HindIII
      ~~~~~~
                  M   A   H   A   R   V   L   L   L   A   L   A   V   L   A   T   A   A   V   A   V
    1 AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG

                                                NPIR                        NotI
                                               ~~~~~~~~~~~~~~               ~~~~~~~~
      · A   S   S   S   S   F   A   D   S   N   P   I   R   P   V   T   D   R   A   A   A   S   T ·
   71 TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC
      · Q   G   I   S   E   D   L   Y   S   R   L   V   E   M   A   T   I   S   Q   A   A   Y   A
  141 GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC TGCCTACGCC

                          SalI
                         ~~~~~~~
       D   L   C   N   I   P   S   T   I   I   K   G   E   K   I   Y   N   S   Q   T   D   I   N   G
  211 GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA TTCTCAAACT GACATTAACG

         BamHI
         ~~~~~~
      · W   I   L   R   D   D   S   S   K   E   I   I   T   V   F   R   G   T   G   S   D   T   N ·
  281 GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA

                        Glycosylation
                        ~~~~
      · L   Q   L   D   T   D   Y   T   L   T   P   F   D   T   L   P   Q   C   N   G   C   E   V
  351 TCTACAACTC GATACTGACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC AATGCAACGG TTGTGAAGTA
       H   G   G   Y   Y   I   G   W   V   S   V   Q   D   Q   V   E   S   L   V   K   Q   Q   V   S
  421 CACGGTGGAT ATTATATTGG ATGGGTCTCC GTCCAGGACC AAGTCGAGTC GCTTGTCAAA CAGCAGGTTA
      · Q   Y   P   D   Y   A   L   T   V   T   G   H   X   L   G   A   S   L   A   A   L   T   A ·
  491 GCCAGTATCC GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC TCCCTGGCGG CACTCACTGC
      · A   Q   L   S   A   T   Y   D   N   I   R   L   Y   T   F   G   E   P   R   S   G   N   Q
  561 CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC ACCTTCGGCG AACCGCGCAG CGGCAATCAG

                                                XhoI
                                               ~~~~~~~
       A   F   A   S   Y   M   N   D   A   F   Q   A   S   S   P   D   T   T   Q   Y   F   R   V   T
  631 GCCTTCGCGT CGTACATGAA CGATGCCTTC CAAGCCTCGA GCCCAGATAC GACGCAGTAT TTCCGGGTCA

                                                                    NcoI
                                                                   ~~~~~~~
      · H   A   N   D   G   I   P   N   L   P   P   V   E   Q   G   Y   A   H   G   G   V   E   Y ·
  701 CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC GCCCATGGCG GTGTAGAGTA
      · W   S   V   D   P   Y   S   A   Q   N   T   F   V   C   T   G   D   E   V   Q   C   C   E
  771 CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG

                                                                          SphI
                                                                         ~~~~
       A   Q   G   G   Q   G   V   N   N   A   H   T   T   Y   F   G   M   T   S   G   A   C   T   W
  841 GCCCAGGGCG GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT GACGAGCGGC GCATGCACCT
```

Figure 32C

```
                    NotI                          KDEL
                 ~~~~~~~~~                ~~~~~~~~~~~~~~~
          ·  P  V  A   A  A  E   T  T  E  G   *
  911   GGCCGGTCGC GGCCGCGGAA ACCACTGAAG GATGAGCTGT AAAGAAGCAG ATCGTTCAAA CATTTGGCAA
  981   TAAAGTTTCT TAAGATTGAA TCCTGTTGCC GGTCTTGCGA TGATTATCAT ATAATTTCTG TTGAATTACG
 1051   TTAAGCATGT AATAATTAAC ATGTAATGCA TGACGTTATT TATGAGATGG GTTTTTATGA TTAGAGTCCC
 1121   GCAATTATAC ATTTAATACG CGATAGAAAA CAAAATATAG CGCGCAAACT AGGATAAATT ATCGCGCGCG

                                  HindIII
                                  ~~~~~~~
                           ClaI          XbaI
                         ~~~~~~        ~~~~~~
 1191   GTGTCATCTA TGTTACTAGA TCGATAAGCT TCTAGAGCGG CCGGTGGAGC TCCAATTCGC CCTATAGTGA
 1261   GTCGTATTAC GCGCGCTCAC TGGCCGTCGT TTTACAACGT CGTGACTGGG AAAACCCTGG CGTTACCCAA
 1331   CTTAATCGCC TTGCAGCACA TCCCCCTTTC GCCAGCTGGC GTAATAGCGA AGAGGCCCGC ACCGATCGCC
 1401   CTTCCCAACA GTTGCGCAGC CTGAATGGCG AATGGGACGC GCCCTGTAGC GGCGCATTAA GCGCGGCGGG
 1471   TGTGGTGGTT ACGCGCAGCG TGACCGCTAC ACTTGCCAGC GCCCTAGCGC CCGCTCCTTT CGCTTTCTTC
 1541   CCTTCCTTTC TCGCCACGTT CGCCGGCTTT CCCCGTCAAG CTCTAAATCG GGGGCTCCCT TTAGGGTTCC
 1611   GATTTAGTGC TTTACGGCAC CTCGACCCCA AAAAACTTGA TTAGGGTGAT GGTTCACGTA GTGGGCCATC
 1681   GCCCTGATAG ACGGTTTTTC GCCCTTTGAC GTTGGAGTCC ACGTTCTTTA ATAGTGGACT CTTGTTCCAA
 1751   ACTGGAACAA CACTCAACCC TATCTCGGTC TATTCTTTTG ATTTATAAGG GATTTTGCCG ATTTCGGCCT
 1821   ATTGGTTAAA AAATGAGCTG ATTTAACAAA AATTTAACGC GAATTTTAAC AAAATATTAA CGCTTACAAT
 1891   TTAGGTGGCA CTTTTCGGGG AAATGTGCGC GGAACCCCTA TTTGTTTATT TTTCTAAATA CATTCAAATA
 1961   TGTATCCGCT CATGAGACAA TAACCCTGAT AAATGCTTCA ATAATATTGA AAAAGGAAGA GTATGAGTAT
 2031   TCAACATTTC CGTGTCGCCC TTATTCCCTT TTTTGCGGCA TTTTGCCTTC CTGTTTTTGC TCACCCAGAA
 2101   ACGCTGGTGA AAGTAAAAGA TGCTGAAGAT CAGTTGGGTG CACGAGTGGG TTACATCGAA CTGGATCTCA
 2171   ACAGCGGTAA GATCCTTGAG AGTTTTCGCC CCGAAGAACG TTTTCCAATG ATGAGCACTT TTAAAGTTCT
 2241   GCTATGTGGC GCGGTATTAT CCCGTATTGA CGCCGGGCAA GAGCAACTCG GTCGCCGCAT ACACTATTCT
 2311   CAGAATGACT TGGTTGAGTA CTCACCAGTC ACAGAAAAGC ATCTTACGGA TGGCATGACA GTAAGAGAAT
 2381   TATGCAGTGC TGCCATAACC ATGAGTGATA ACACTGCGGC CAACTTACTT CTGACAACGA TCGGAGGACC
 2451   GAAGGAGCTA ACCGCTTTTT TGCACAACAT GGGGGATCAT GTAACTCGCC TTGATCGTTG GGAACCGGAG
 2521   CTGAATGAAG CCATACCAAA CGACGAGCGT GACACCACGA TGCCTGTAGC AATGGCAACA ACGTTGCGCA
 2591   AACTATTAAC TGGCGAACTA CTTACTCTAG CTTCCCGGCA ACAATTAATA GACTGGATGG AGGCGGATAA
 2661   AGTTGCAGGA CCACTTCTGC GCTCGGCCCT TCCGGCTGGC TGGTTTATTG CTGATAAATC TGGAGCCGGT
 2731   GAGCGTGGGT CTCGCGGTAT CATTGCAGCA CTGGGGCCAG ATGGTAAGCC CTCCCGTATC GTAGTTATCT
 2801   ACACGACGGG GAGTCAGGCA ACTATGGATG AACGAAATAG ACAGATCGCT GAGATAGGTG CCTCACTGAT
 2871   TAAGCATTGG TAACTGTCAG ACCAAGTTTA CTCATATATA CTTTAGATTG ATTTAAAACT TCATTTTTAA
 2941   TTTAAAAGGA TCTAGGTGAA GATCCTTTTT GATAATCTCA TGACCAAAAT CCCTTAACGT GAGTTTTCGT
 3011   TCCACTGAGC GTCAGACCCC GTAGAAAAGA TCAAAGGATC TTCTTGAGAT CCTTTTTTTC TGCGCGTAAT
 3081   CTGCTGCTTG CAAACAAAAA AACCACCGCT ACCAGCGGTG GTTTGTTTGC CGGATCAAGA GCTACCAACT
 3151   CTTTTTCCGA AGGTAACTGG CTTCAGCAGA GCGCAGATAC CAAATACTGT CCTTCTAGTG TAGCCGTAGT
 3221   TAGGCCACCA CTTCAAGAAC TCTGTAGCAC CGCCTACATA CCTCGCTCTG CTAATCCTGT TACCAGTGGC
 3291   TGCTGCCAGT GGCGATAAGT CGTGTCTTAC CGGGTTGGAC TCAAGACGAT AGTTACCGGA TAAGGCGCAG
 3361   CGGTCGGGCT GAACGGGGGG TTCGTGCACA CAGCCCAGCT TGGAGCGAAC GACCTACACC GAACTGAGAT
 3431   ACCTACAGCG TGAGCTATGA GAAAGCGCCA CGCTTCCCGA AGGGAGAAAG GCGGACAGGT ATCCGGTAAG
 3501   CGGCAGGGTC GGAACAGGAG AGCGCACGAG GGAGCTTCCA GGGGGAAACG CCTGGTATCT TTATAGTCCT
 3571   GTCGGGTTTC GCCACCTCTG ACTTGAGCGT CGATTTTTGT GATGCTCGTC AGGGGGGCGG AGCCTATGGA
 3641   AAAACGCCAG CAACGCGGCC TTTTTACGGT TCCTGGCCTT TTGCTGGCCT TTTGCTCACA TGTTCTTTCC
 3711   TGCGTTATCC CCTGATTCTG TGGATAACCG TATTACCGCC TTTGAGTGAG CTGATACCGC TCGCCGCAGC
 3781   CGAACGACCG AGCGCAGCGA GTCAGTGAGC GAGGAAGCGG AAGAGCGCCC AATACGCAAA CCGCCTCTCC
 3851   CCGCGCGTTG GCCGATTCAT TAATGCAGCT GGCACGACAG GTTTCCCGAC TGGAAAGCGG GCAGTGAGCG
 3921   CAACGCAATT AATGTGAGTT AGCTCACTCA TTAGGCACCC CAGGCTTTAC ACTTTATGCT TCCGGCTCGT
 3991   ATGTTGTGTG GAATTGTGAG CGGATAACAA TTTCACACAG GAAACAGCTA TGACCATGAT TACGCCAAGC
```

Figure 32D

```
                                                  KpnI                XhoI
                                                  ~~~~~~~             ~~~~~~~
4061   GCGCAATTAA CCCTCACTAA AGGGAACAAA AGCTGGGTAC CGGGCCCCCC CTCGAGGTCA TTCATATGCT
4131   TGAGAAGAGA GTCGGGATAG TCCAAAATAA AACAAAGGTA AGATTACCTG GTCAAAAGTG AAAACATCAG
4201   TTAAAAGGTG GTATAAGTAA AATATCGGTA ATAAAAGGTG GCCCAAAGTG AAATTTACTC TTTTCTACTA
4271   TTATAAAAAT TGAGGATGTT TTGTCGGTAC TTTGATACGT CATTTTTGTA TGAATTGGTT TTTAAGTTTA
4341   TTCGCGATTT GGAAATGCAT ATCTGTATTT GAGTCGGTTT TTAAGTTCGT TGCTTTTGTA AATACAGAGG
4411   GATTTGTATA AGAAATATCT TTAAAAAACC CATATGCTAA TTTGACATAA TTTTTGAGAA AAATATATAT
             EcoRI
             ~~~~~~~
4481   TCAGGCGAAT TCCACAATGA ACAATAATAA GATTAAAATA GCTTGCCCCC GTTGCAGCGA TGGGTATTTT
4551   TTCTAGTAAA ATAAAAGATA AACTTAGACT CAAAACATTT ACAAAAACAA CCCCTAAAGT CCTAAAGCCC
4621   AAAGTGCTAT GCACGATCCA TAGCAAGCCC AGCCCAACCC AACCCAACCC AACCCACCCC AGTGCAGCCA
4691   ACTGGCAAAT AGTCTCCACC CCCGGCACTA TCACCGTGAG TTGTCCGCAC CACCGCACGT CTCGCAGCCA
4761   AAAAAAAAAA AAGAAAGAAA AAAAAGAAAA AGAAAAACAG CAGGTGGGTC CGGGTCGTGG GGGCCGGAAA
4831   AGCGAGGAGG ATCGCGAGCA GCGACGAGGC CCGGCCCTCC CTCCGCTTCC AAAGAAACGC CCCCCATCGC
4901   CACTATATAC ATACCCCCCC CTCTCCTCCC ATCCCCCCAA CCCTACCACC ACCACCACCA CCACCTCCTC
4971   CCCCCTCGCT GCCGGACGAC GAGCTCCTCC CCCCTCCCCC TCCGCCGCCG CCGGTAACCA CCCCGCCCCT
5041   CTCCTCTTTC TTTCTCCGTT TTTTTTTTCG TCTCGGTCTC GATCTTTGGC CTTGGTAGTT TGGGTGGGCG
5111   AGAGCGGCTT CGTCGCCCAG ATCGGTGCGC GGGAGGGGCG GGATCTCGCG GCTGGCGTCT CCGGGCGTGA
              BamHI                                 BglII
              ~~~~~~~                               ~~~~~~~
5181   GTCGGCCCGG ATCCTCGCGG GGAATGGGGC TCTCGGATGT AGATCTTCTT TCTTTCTTCT TTTTGTGGTA
5251   GAATTTGAAT CCCTCAGCAT TGTTCATCGG TAGTTTTTCT TTTCATGATT TGTGACAAAT GCAGCCTCGT
5321   GCGGAGCTTT TTTGTAGC
```

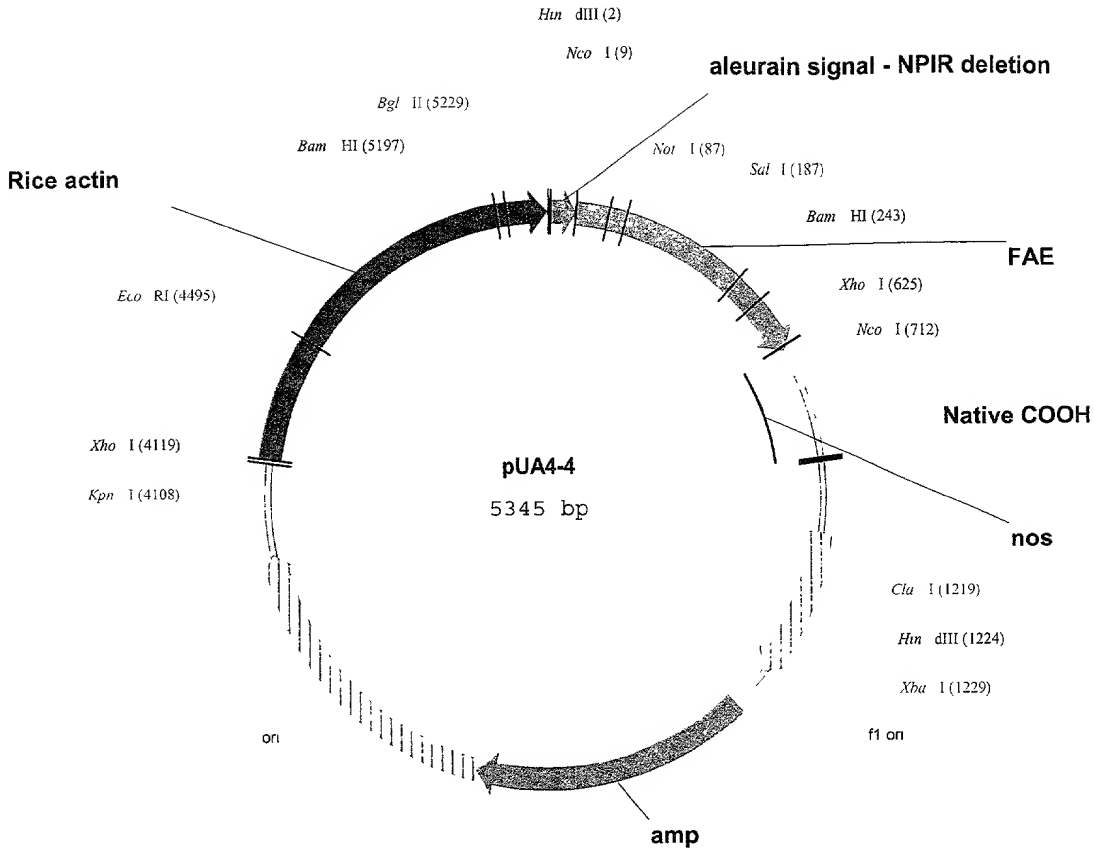

Hin dIII (2)
Nco I (9)
aleurain signal - NPIR deletion
Bgl II (5229)
Bam HI (5197)
Not I (87)
Sal I (187)
Rice actin
Bam HI (243)
FAE
Eco RI (4495)
Xho I (625)
Nco I (712)
Native COOH
Xho I (4119)
pUA4-4
Kpn I (4108)
5345 bp
nos
Cla I (1219)
Hin dIII (1224)
Xba I (1229)
ori
f1 ori
amp

Figure 33A

Figure 33 B

```
                NcoI
               ~~~~~~~
      HindIII
      ~~~~~~
                 M   A   H   A   R   V   L   L   L   A   L   A   V   L   A   T   A   A   V   A   V
    1 AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG
                        NotI
                      ~~~~~~~~~
      ·   A   S   S   R   A   A   A   S   T   Q   G   I   S   E   D   L   Y   S   R   L   V   E   M ·
   71 TCGCCTCCTC CCGCGCGGCC GCCTCCACGC AGGGCATCTC CGAAGACCTC TACAGCCGTT TAGTCGAAAT
                                                                SalI
                                                               ~~~~~~~
      ·   A   T   I   S   Q   A   A   Y   A   D   L   C   N   I   P   S   T   I   I   K   G   E   K
  141 GGCCACTATC TCCCAAGCTG CCTACGCCGA CCTGTGCAAC ATTCCGTCGA CTATTATCAA GGGAGAGAAA
                                       BamHI
                                      ~~~~~~~
       I   Y   N   S   Q   T   D   I   N   G   W   I   L   R   D   D   S   S   K   E   I   I   T   V
  211 ATTTACAATT CTCAAACTGA CATTAACGGA TGGATCCTCC GCGACGACAG CAGCAAAGAA ATAATCACCG
      ·   F   R   G   T   G   S   D   T   N   L   Q   L   D   T   N   Y   T   L   T   P   F   D   T ·
  281 TCTTCCGTGG CACTGGTAGT GATACGAATC TACAACTCGA TACTAACTAC ACCCTCACGC CTTTCGACAC
      ·   L   P   Q   C   N   G   C   E   V   H   G   G   Y   Y   I   G   W   V   S   V   Q   D   Q
  351 CCTACCACAA TGCAACGGTT GTGAAGTACA CGGTGGATAT TATATTGGAT GGGTCTCCGT CCAGGACCAA
       V   E   S   L   V   K   Q   Q   V   S   Q   Y   P   D   Y   A   L   T   V   T   G   H   X   L
  421 GTCGAGTCGC TTGTCAAACA GCAGGTTAGC CAGTATCCGG ACTACGCGCT GACCGTGACC GGCCACKCCC
      ·   G   A   S   L   A   A   L   T   A   A   Q   L   S   A   T   Y   D   N   I   R   L   Y   T ·
  491 TCGGCGCCTC CCTGGCGGCA CTCACTGCCG CCCAGCTGTC TGCGACATAC GACAACATCC GCCTGTACAC
                                                                                  XhoI
                                                                                  ~
      ·   F   G   E   P   R   S   G   N   Q   A   F   A   S   Y   M   N   D   A   F   Q   A   S   S
  561 CTTCGGCGAA CCGCGCAGCG GCAATCAGGC CTTCGCGTCG TACATGAACG ATGCCTTCCA AGCCTCGAGC
       P   D   T   T   Q   Y   F   R   V   T   H   A   N   D   G   I   P   N   L   P   P   V   E   Q
  631 CCAGATACGA CGCAGTATTT CCGGGTCACT CATGCCAACG ACGGCATCCC AAACCTGCCC CCGGTGGAGC
                    NcoI
                   ~~~~~~
      ·   G   Y   A   H   G   G   V   E   Y   W   S   V   D   P   Y   S   A   Q   N   T   F   V   C ·
  701 AGGGGTACGC CCATGGCGGT GTAGAGTACT GGAGCGTTGA TCCTTACAGC GCCCAGAACA CATTTGTCTG
      ·   T   G   D   E   V   Q   C   C   E   A   Q   G   G   Q   G   V   N   N   A   H   T   T   Y
  771 CACTGGGGAT GAAGTGCAGT GCTGTGAGGC CCAGGGCGGA CAGGGTGTGA ATAATGCGCA CACGACTTAT
       F   G   M   T   S   G   A   C   T   W   *
  841 TTTGGGATGA CGAGCGGAGC CTGTACATGG TGATCAGTCA TTTCAGCCTC CCCGAGTGTA CCAGGAAAGA
  911 TGGATGTCCT GGAGAGGGGG CCGCGTAACC ACTGAAGGAT GAGCTGTAAA GAAGCAGATC GTTCAAACAT
  981 TTGGCAATAA AGTTTCTTAA GATTGAATCC TGTTGCCGGT CTTGCGATGA TTATCATATA ATTTCTGTTG
 1051 AATTACGTTA AGCATGTAAT AATTAACATG TAATGCATGA CGTTATTTAT GAGATGGGTT TTTATGATTA
 1121 GAGTCCCGCA ATTATACATT TAATACGCGA TAGAAAACAA AATATAGCGC GCAAACTAGG ATAAATTATC
                                       HindIII
                                      ~~~~~~~
                                  ClaI        XbaI
                                 ~~~~~~~     ~~~~~~
 1191 GCGCGCGGTG TCATCTATGT TACTAGATCG ATAAGCTTCT AGAGCGGCCG GTGGAGCTCC AATTCGCCCT
 1261 ATAGTGAGTC GTATTACGCG CGCTCACTGG CCGTCGTTTT ACAACGTCGT GACTGGGAAA ACCCTGGCGT
 1331 TACCCAACTT AATCGCCTTG CAGCACATCC CCCTTTCGCC AGCTGGCGTA ATAGCGAAGA GGCCCGCACC
 1401 GATCGCCCTT CCCAACAGTT GCGCAGCCTG AATGGCGAAT GGGACGCGCC CTGTAGCGGC GCATTAAGCG
 1471 CGGCGGGTGT GGTGGTTACG CGCAGCGTGA CCGCTACACT TGCCAGCGCC CTAGCGCCCG CTCCTTTCGC
 1541 TTTCTTCCCT TCCTTTCTCG CCACGTTCGC CGGCTTTCCC CGTCAAGCTC TAAATCGGGG GCTCCCTTTA
 1611 GGGTTCCGAT TTAGTGCTTT ACGGCACCTC GACCCCAAAA AACTTGATTA GGGTGATGGT TCACGTAGTG
 1681 GGCCATCGCC CTGATAGACG GTTTTTCGCC CTTTGACGTT GGAGTCCACG TTCTTTAATA GTGGACTCTT
 1751 GTTCCAAACT GGAACAACAC TCAACCCTAT CTCGGTCTAT TCTTTTGATT TATAAGGGAT TTTGCCGATT
 1821 TCGGCCTATT GGTTAAAAAA TGAGCTGATT TAACAAAAAT TTAACGCGAA TTTTAACAAA ATATTAACGC
 1891 TTACAATTTA GGTGGCACTT TTCGGGGAAA TGTGCGCGGA ACCCCTATTT GTTTATTTTT CTAAATACAT
 1961 TCAAATATGT ATCCGCTCAT GAGACAATAA CCCTGATAAA TGCTTCAATA ATATTGAAAA AGGAAGAGTA
```

Figure 33C

```
2031    TGAGTATTCA ACATTTCCGT GTCGCCCTTA TTCCCTTTTT TGCGGCATTT TGCCTTCCTG TTTTTGCTCA
2101    CCCAGAAACG CTGGTGAAAG TAAAAGATGC TGAAGATCAG TTGGGTGCAC GAGTGGGTTA CATCGAACTG
2171    GATCTCAACA GCGGTAAGAT CCTTGAGAGT TTTCGCCCCG AAGAACGTTT TCCAATGATG AGCACTTTTA
2241    AAGTTCTGCT ATGTGGCGCG GTATTATCCC GTATTGACGC CGGGCAAGAG CAACTCGGTC GCCGCATACA
2311    CTATTCTCAG AATGACTTGG TTGAGTACTC ACCAGTCACA GAAAAGCATC TTACGGATGG CATGACAGTA
2381    AGAGAATTAT GCAGTGCTGC CATAACCATG AGTGATAACA CTGCGGCCAA CTTACTTCTG ACAACGATCG
2451    GAGGACCGAA GGAGCTAACC GCTTTTTTGC ACAACATGGG GGATCATGTA ACTCGCCTTG ATCGTTGGGA
2521    ACCGGAGCTG AATGAAGCCA TACCAAACGA CGAGCGTGAC ACCACGATGC CTGTAGCAAT GGCAACAACG
2591    TTGCGCAAAC TATTAACTGG CGAACTACTT ACTCTAGCTT CCCGGCAACA ATTAATAGAC TGGATGGAGG
2661    CGGATAAAGT TGCAGGACCA CTTCTGCGCT CGGCCCTTCC GGCTGGCTGG TTTATTGCTG ATAAATCTGG
2731    AGCCGGTGAG CGTGGGTCTC GCGGTATCAT TGCAGCACTG GGGCCAGATG GTAAGCCCTC CCGTATCGTA
2801    GTTATCTACA CGACGGGGAG TCAGGCAACT ATGGATGAAC GAAATAGACA GATCGCTGAG ATAGGTGCCT
2871    CACTGATTAA GCATTGGTAA CTGTCAGACC AAGTTTACTC ATATATACTT TAGATTGATT TAAAACTTCA
2941    TTTTTAATTT AAAAGGATCT AGGTGAAGAT CCTTTTTGAT AATCTCATGA CCAAAATCCC TTAACGTGAG
3011    TTTTCGTTCC ACTGAGCGTC AGACCCCGTA GAAAAGATCA AAGGATCTTC TTGAGATCCT TTTTTTCTGC
3081    GCGTAATCTG CTGCTTGCAA ACAAAAAAAC CACCGCTACC AGCGGTGGTT TGTTTGCCGG ATCAAGAGCT
3151    ACCAACTCTT TTTCCGAAGG TAACTGGCTT CAGCAGAGCG CAGATACCAA ATACTGTCCT TCTAGTGTAG
3221    CCGTAGTTAG GCCACCACTT CAAGAACTCT GTAGCACCGC CTACATACCT CGCTCTGCTA ATCCTGTTAC
3291    CAGTGGCTGC TGCCAGTGGC GATAAGTCGT GTCTTACCGG GTTGGACTCA AGACGATAGT TACCGGATAA
3361    GGCGCAGCGG TCGGGCTGAA CGGGGGGTTC GTGCACACAG CCCAGCTTGG AGCGAACGAC CTACACCGAA
3431    CTGAGATACC TACAGCGTGA GCTATGAGAA AGCGCCACGC TTCCCGAAGG GAGAAAGGCG GACAGGTATC
3501    CGGTAAGCGG CAGGGTCGGA ACAGGAGAGC GCACGAGGGA GCTTCCAGGG GGAAACGCCT GGTATCTTTA
3571    TAGTCCTGTC GGGTTTCGCC ACCTCTGACT TGAGCGTCGA TTTTTGTGAT GCTCGTCAGG GGGGCGGAGC
3641    CTATGGAAAA ACGCCAGCAA CGCGGCCTTT TTACGGTTCC TGGCCTTTTG CTGGCCTTTT GCTCACATGT
3711    TCTTTCCTGC GTTATCCCCT GATTCTGTGG ATAACCGTAT TACCGCCTTT GAGTGAGCTG ATACCGCTCG
3781    CCGCAGCCGA ACGACCGAGC GCAGCGAGTC AGTGAGCGAG GAAGCGGAAG AGCGCCCAAT ACGCAAACCG
3851    CCTCTCCCCG CGCGTTGGCC GATTCATTAA TGCAGCTGGC ACGACAGGTT TCCCGACTGG AAAGCGGGCA
3921    GTGAGCGCAA CGCAATTAAT GTGAGTTAGC TCACTCATTA GGCACCCCAG GCTTTACACT TTATGCTTCC
3991    GGCTCGTATG TTGTGTGGAA TTGTGAGCGG ATAACAATTT CACACAGGAA ACAGCTATGA CCATGATTAC
                                                      KpnI            XhoI
                                                      ~~~~~~~         ~~~~~~
4061    GCCAAGCGCG CAATTAACCC TCACTAAAGG GAACAAAAGC TGGGTACCGG GCCCCCCCTC GAGGTCATTC
4131    ATATGCTTGA GAAGAGAGTC GGGATAGTCC AAAATAAAAC AAAGGTAAGA TTACCTGGTC AAAAGTGAAA
4201    ACATCAGTTA AAAGGTGGTA TAAGTAAAAT ATCGGTAATA AAAGGTGGCC CAAAGTGAAA TTTACTCTTT
4271    TCTACTATTA TAAAAATTGA GGATGTTTTG TCGGTACTTT GATACGTCAT TTTTGTATGA ATTGGTTTTT
4341    AAGTTTATTC GCGATTTGGA AATGCATATC TGTATTTGAG TCGGTTTTTA AGTTCGTTGC TTTTGTAAAT
4411    ACAGAGGGAT TTGTATAAGA AATATCTTTA AAAAACCCAT ATGCTAATTT GACATAATTT TTGAGAAAAA
                      EcoRI
                      ~~~~~~~
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4551    GTATTTTTTC TAGTAAAATA AAAGATAAAC TTAGACTCAA AACATTTACA AAAACAACCC CTAAAGTCCT
4621    AAAGCCCAAA GTGCTATGCA CGATCCATAG CAAGCCCAGC CCAACCCAAC CCAACCCAAC CCACCCCAGT
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4971    CCTCCTCCCC CCTCGCTGCC GGACGACGAG CTCCTCCCCC CTCCCCCTCC GCCGCCGCCG GTAACCACCC
5041    CGCCCCTCTC CTCTTTCTTT CTCCGTTTTT TTTTTCGTCT CGGTCTCGAT CTTTGGCCTT GGTAGTTTGG
5111    GTGGGCGAGA GCGGCTTCGT CGCCCAGATC GGTGCGCGGG AGGGGCGGGA TCTCGCGGCT GGCGTCTCCG
                        BamHI                                 BglII
                        ~~~~~~~                               ~~~~~~
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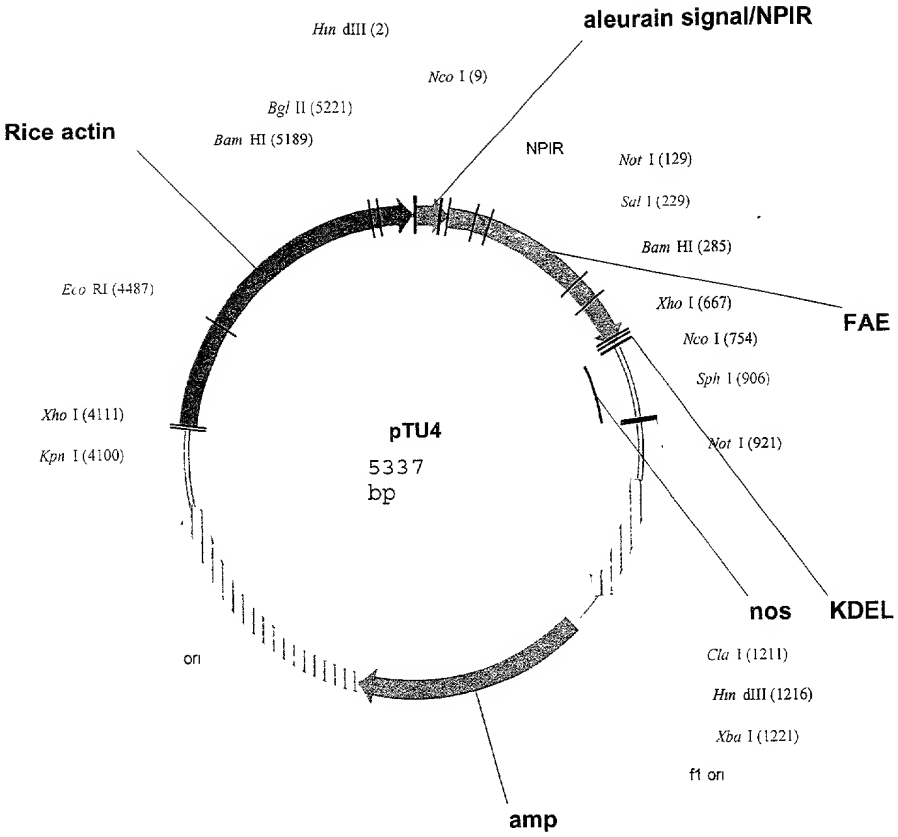
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Bgl II (5221)
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Sal I (229)
Bam HI (285)
Eco RI (4487)
Xho I (667)
FAE
Nco I (754)
Sph I (906)
Xho I (4111)
pTU4
5337
bp
Not I (921)
Kpn I (4100)
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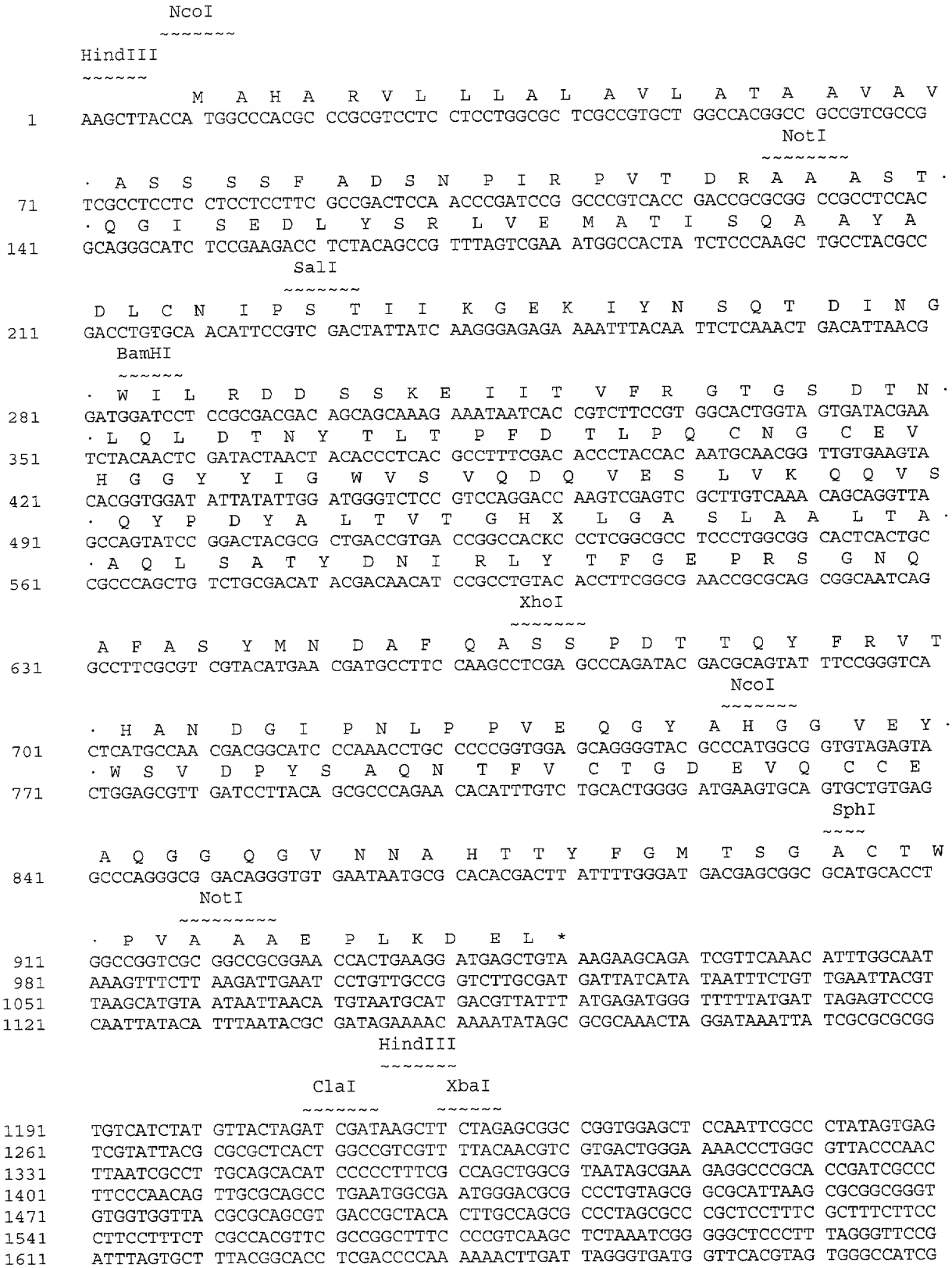
KDEL
Cla I (1211)
Hin dIII (1216)
Xba I (1221)
ori
f1 ori
amp

Figure 34 A

Figure 34 B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HindIII
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NotI
· A S S S S F A D S N P I R P V T D R A A A S T ·
71 TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC
· Q G I S E D L Y S R L V E M A T I S Q A A Y A
141 GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC TGCCTACGCC
SalI
D L C N I P S T I I K G E K I Y N S Q T D I N G
211 GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA TTCTCAAACT GACATTAACG
BamHI
· W I L R D D S S K E I I T V F R G T G S D T N ·
281 GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA
· L Q L D T N Y T L T P F D T L P Q C N G C E V
351 TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC AATGCAACGG TTGTGAAGTA
H G G Y Y I G W V S V Q D Q V E S L V K Q Q V S
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· Q Y P D Y A L T V T G H X L G A S L A A L T A ·
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· A Q L S A T Y D N I R L Y T F G E P R S G N Q
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XhoI
A F A S Y M N D A F Q A S S P D T T Q Y F R V T
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NcoI
· H A N D G I P N L P P V E Q G Y A H G G V E Y ·
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· W S V D P Y S A Q N T F V C T G D E V Q C C E
771 CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG
SphI
A Q G G Q G V N N A H T T Y F G M T S G A C T W
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NotI
· P V A A A E P L K D E L *
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981 AAAGTTTCTT AAGATTGAAT CCTGTTGCCG GTCTTGCGAT GATTATCATA TAATTTCTGT TGAATTACGT
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HindIII
ClaI
XbaI
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1331 TTAATCGCCT TGCAGCACAT CCCCCTTTCG CCAGCTGGCG TAATAGCGAA GAGGCCCGCA CCGATCGCCC
1401 TTCCCAACAG TTGCGCAGCC TGAATGGCGA ATGGGACGCG CCCTGTAGCG GCGCATTAAG CGCGGCGGGT
1471 GTGGTGGTTA CGCGCAGCGT GACCGCTACA CTTGCCAGCG CCCTAGCGCC CGCTCCTTTC GCTTTCTTCC
1541 CTTCCTTTCT CGCCACGTTC GCCGGCTTTC CCCGTCAAGC TCTAAATCGG GGGCTCCCTT TAGGGTTCCG
1611 ATTTAGTGCT TTACGGCACC TCGACCCCAA AAAACTTGAT TAGGGTGATG GTTCACGTAG TGGGCCATCG

Figure 34 C

```
1681    CCCTGATAGA CGGTTTTTCG CCCTTTGACG TTGGAGTCCA CGTTCTTTAA TAGTGGACTC TTGTTCCAAA
1751    CTGGAACAAC ACTCAACCCT ATCTCGGTCT ATTCTTTTGA TTTATAAGGG ATTTTGCCGA TTTCGGCCTA
1821    TTGGTTAAAA AATGAGCTGA TTTAACAAAA ATTTAACGCG AATTTTAACA AAATATTAAC GCTTACAATT
1891    TAGGTGGCAC TTTTCGGGGA AATGTGCGCG GAACCCCTAT TTGTTTATTT TTCTAAATAC ATTCAAATAT
1961    GTATCCGCTC ATGAGACAAT AACCCTGATA ATGCTTCAA TAATATTGAA AAAGGAAGAG TATGAGTATT
2031    CAACATTTCC GTGTCGCCCT TATTCCCTTT TTTGCGGCAT TTTGCCTTCC TGTTTTTGCT CACCCAGAAA
2101    CGCTGGTGAA AGTAAAAGAT GCTGAAGATC AGTTGGGTGC ACGAGTGGGT TACATCGAAC TGGATCTCAA
2171    CAGCGGTAAG ATCCTTGAGA GTTTTCGCCC CGAAGAACGT TTTCCAATGA TGAGCACTTT TAAAGTTCTG
2241    CTATGTGGCG CGGTATTATC CCGTATTGAC GCCGGGCAAG AGCAACTCGG TCGCCGCATA CACTATTCTC
2311    AGAATGACTT GGTTGAGTAC TCACCAGTCA CAGAAAAGCA TCTTACGGAT GGCATGACAG TAAGAGAATT
2381    ATGCAGTGCT GCCATAACCA TGAGTGATAA CACTGCGGCC AACTTACTTC TGACAACGAT CGGAGGACCG
2451    AAGGAGCTAA CCGCTTTTTT GCACAACATG GGGGATCATG TAACTCGCCT TGATCGTTGG GAACCGGAGC
2521    TGAATGAAGC CATACCAAAC GACGAGCGTG ACACCACGAT GCCTGTAGCA ATGGCAACAA CGTTGCGCAA
2591    ACTATTAACT GGCGAACTAC TTACTCTAGC TTCCCGGCAA CAATTAATAG ACTGGATGGA GGCGGATAAA
2661    GTTGCAGGAC CACTTCTGCG CTCGGCCCTT CCGGCTGGCT GGTTTATTGC TGATAAATCT GGAGCCGGTG
2731    AGCGTGGGTC TCGCGGTATC ATTGCAGCAC TGGGGCCAGA TGGTAAGCCC TCCCGTATCG TAGTTATCTA
2801    CACGACGGGG AGTCAGGCAA CTATGGATGA ACGAAATAGA CAGATCGCTG AGATAGGTGC CTCACTGATT
2871    AAGCATTGGT AACTGTCAGA CCAAGTTTAC TCATATATAC TTTAGATTGA TTTAAAACTT CATTTTTAAT
2941    TTAAAAGGAT CTAGGTGAAG ATCCTTTTTG ATAATCTCAT GACCAAAATC CCTTAACGTG AGTTTTCGTT
3011    CCACTGAGCG TCAGACCCCG TAGAAAAGAT CAAAGGATCT TCTTGAGATC CTTTTTTTCT GCGCGTAATC
3081    TGCTGCTTGC AAACAAAAAA ACCACCGCTA CCAGCGGTGG TTTGTTTGCC GGATCAAGAG CTACCAACTC
3151    TTTTTCCGAA GGTAACTGGC TTCAGCAGAG CGCAGATACC AAATACTGTC CTTCTAGTGT AGCCGTAGTT
3221    AGGCCACCAC TTCAAGAACT CTGTAGCACC GCCTACATAC CTCGCTCTGC TAATCCTGTT ACCAGTGGCT
3291    GCTGCCAGTG GCGATAAGTC GTGTCTTACC GGGTTGGACT CAAGACGATA GTTACCGGAT AAGGCGCAGC
3361    GGTCGGGCTG AACGGGGGGT TCGTGCACAC AGCCCAGCTT GGAGCGAACG ACCTACACCG AACTGAGATA
3431    CCTACAGCGT GAGCTATGAG AAAGCGCCAC GCTTCCCGAA GGGAGAAAGG CGGACAGGTA TCCGGTAAGC
3501    GGCAGGGTCG GAACAGGAGA GCGCACGAGG GAGCTTCCAG GGGGAAACGC CTGGTATCTT TATAGTCCTG
3571    TCGGGTTTCG CCACCTCTGA CTTGAGCGTC GATTTTTGTG ATGCTCGTCA GGGGGGCGGA GCCTATGGAA
3641    AAACGCCAGC AACGCGGCCT TTTTACGGTT CCTGGCCTTT TGCTGGCCTT TTGCTCACAT GTTCTTTCCT
3711    GCGTTATCCC CTGATTCTGT GGATAACCGT ATTACCGCCT TTGAGTGAGC TGATACCGCT CGCCGCAGCC
3781    GAACGACCGA GCGCAGCGAG TCAGTGAGCG AGGAAGCGGA AGAGCGCCCA ATACGCAAAC CGCCTCTCCC
3851    CGCGCGTTGG CCGATTCATT AATGCAGCTG GCACGACAGG TTTCCCGACT GGAAAGCGGG CAGTGAGCGC
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3991    TGTTGTGTGG AATTGTGAGC GGATAACAAT TTCACACAGG AAACAGCTAT GACCATGATT ACGCCAAGCG
                                              KpnI            XhoI
                                              ~~~~~~~         ~~~~~~
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4131    GAGAAGAGAG TCGGGATAGT CCAAAATAAA ACAAAGGTAA GATTACCTGG TCAAAAGTGA AAACATCAGT
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4271    TATAAAAATT GAGGATGTTT TGTCGGTACT TTGATACGTC ATTTTTGTAT GAATTGGTTT TTAAGTTTAT
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4411    ATTTGTATAA GAAATATCTT TAAAAAACCC ATATGCTAAT TTGACATAAT TTTTGAGAAA AATATATATT
             EcoRI
             ~~~~~~~
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4551    TCTAGTAAAA TAAAAGATAA ACTTAGACTC AAAACATTTA CAAAAACAAC CCCTAAAGTC CTAAAGCCCA
4621    AAGTGCTATG CACGATCCAT AGCAAGCCCA GCCCAACCCA ACCCAACCCA ACCCACCCCA GTGCAGCCAA
4691    CTGGCAAATA GTCTCCACCC CCGGCACTAT CACCGTGAGT TGTCCGCACC ACCGCACGTC TCGCAGCCAA
4761    AAAAAAAAAA AGAAAGAAAA AAAAGAAAAA GAAAAACAGC AGGTGGGTCC GGGTCGTGGG GGCCGGAAAA
4831    GCGAGGAGGA TCGCGAGCAG CGACGAGGCC CGGCCCTCCC TCCGCTTCCA AAGAAACGCC CCCCATCGCC
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4971    CCCCTCGCTG CCGGACGACG AGCTCCTCCC CCCTCCCCCT CCGCCGCCGC CGGTAACCAC CCCGCCCCTC
5041    TCCTCTTTCT TTCTCCGTTT TTTTTTTCGT CTCGGTCTCG ATCTTTGGCC TTGGTAGTTT GGGTGGGCGA
5111    GAGCGGCTTC GTCGCCCAGA TCGGTGCGCG GGAGGGGCGG GATCTCGCGG CTGGCGTCTC CGGGCGTGAG
              BamHI                                 BglII
              ~~~~~~~                               ~~~~~~
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5321    CGGAGCTTTT TTGTAGC
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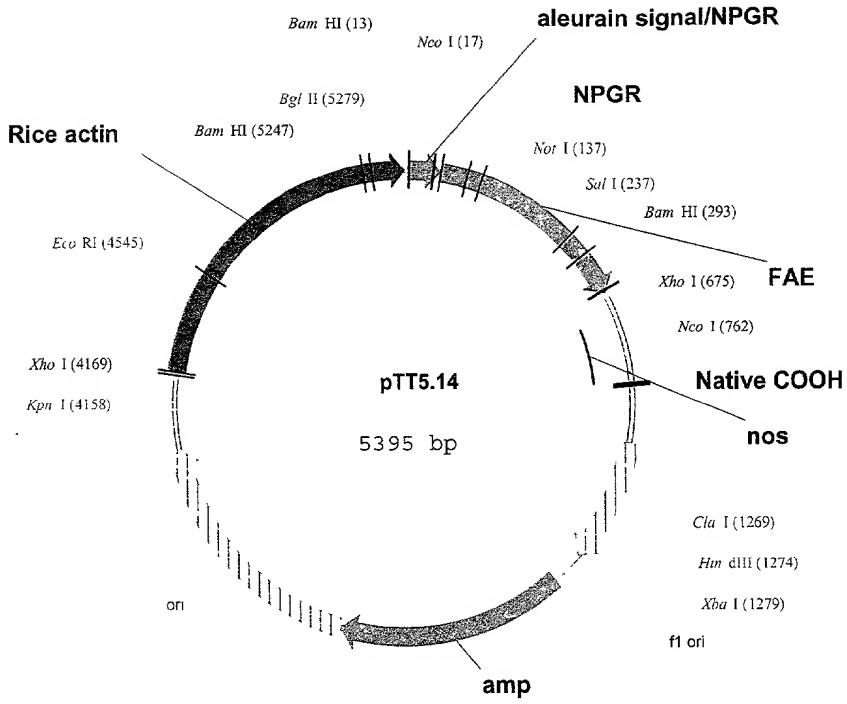
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Sal I (237)
Bam HI (293)
Eco RI (4545)
Xho I (675)
FAE
Nco I (762)
Xho I (4169)
pTT5.14
Native COOH
Kpn I (4158)
5395 bp
nos
Cla I (1269)
Hin dIII (1274)
Xba I (1279)
ori
f1 ori
amp

Figure 35 A

Figure 35B

```
                    NcoI
                    ~~~~~~~
                 BamHI
                 ~~~~~~
                       M  A  H  A  R  V  L  L  L  A  L  A  V  L  A  T  A  A ·
   1  CCTGACGCCG AGGATCCATG GCCCACGCCC GCGTCCTCCT CCTGGCGCTC GCCGTGCTGG CCACGGCCGC
                                                                        NotI
      · V  A  V  A  S  S  S  S  F  A  D  S  N  P  G  R  P  V  T  D  R  A  A
  71  CGTCGCCGTC GCCTCCTCCT CCTCCTTCGC CGACTCCAAC CCGGGCCGGC CCGTCACCGA CCGCGCGGCC
      NotI
      ~~
       A  S  T  Q  G  I  S  E  D  L  Y  S  R  L  V  E  M  A  T  I  S  Q  A  A
 141  GCCTCCACGC AGGGCATCTC CGAAGACCTC TACAGCCGTT TAGTCGAAAT GGCCACTATC TCCCAAGCTG
                                 SalI
                                 ~~~~~~~
      · Y  A  D  L  C  N  I  P  S  T  I  I  K  G  E  K  I  Y  N  S  Q  T  D ·
 211  CCTACGCCGA CCTGTGCAAC ATTCCGTCGA CTATTATCAA GGGAGAGAAA ATTTACAATT CTCAAACTGA
                 BamHI
                 ~~~~~~
      · I  N  G  W  I  L  R  D  D  S  S  K  E  I  I  T  V  F  R  G  T  G  S
 281  CATTAACGGA TGGATCCTCC GCGACGACAG CAGCAAAGAA ATAATCACCG TCTTCCGTGG CACTGGTAGT
       D  T  N  L  Q  L  D  T  N  Y  T  L  T  P  F  D  T  L  P  Q  C  N  G  C
 351  GATACGAATC TACAACTCGA TACTAACTAC ACCCTCACGC CTTTCGACAC CCTACCACAA TGCAACGGTT
      · E  V  H  G  G  Y  Y  I  G  W  V  S  V  Q  D  Q  V  E  S  L  V  K  Q ·
 421  GTGAAGTACA CGGTGGATAT TATATTGGAT GGGTCTCCGT CCAGGACCAA GTCGAGTCGC TTGTCAAACA
      · Q  V  S  Q  Y  P  D  Y  A  L  T  V  T  G  H  X  L  G  A  S  L  A  A
 491  GCAGGTTAGC CAGTATCCGG ACTACGCGCT GACCGTGACC GGCCACKCCC TCGGCGCCTC CCTGGCGGCA
       L  T  A  A  Q  L  S  A  T  Y  D  N  I  R  L  Y  T  F  G  E  P  R  S  G
 561  CTCACTGCCG CCCAGCTGTC TGCGACATAC GACAACATCC GCCTGTACAC CTTCGGCGAA CCGCGCAGCG
                                                    XhoI
                                                    ~~~~~~~
      · N  Q  A  F  A  S  Y  M  N  D  A  F  Q  A  S  S  P  D  T  T  Q  Y  F ·
 631  GCAATCAGGC CTTCGCGTCG TACATGAACG ATGCCTTCCA AGCCTCGAGC CCAGATACGA CGCAGTATTT
                                                                    NcoI
                                                                    ~~~~
      · R  V  T  H  A  N  D  G  I  P  N  L  P  P  V  E  Q  G  Y  A  H  G  G
 701  CCGGGTCACT CATGCCAACG ACGGCATCCC AAACCTGCCC CCGGTGGAGC AGGGGTACGC CCATGGCGGT
       V  E  Y  W  S  V  D  P  Y  S  A  Q  N  T  F  V  C  T  G  D  E  V  Q  C
 771  GTAGAGTACT GGAGCGTTGA TCCTTACAGC GCCCAGAACA CATTTGTCTG CACTGGGGAT GAAGTGCAGT
      · C  E  A  Q  G  G  Q  G  V  N  N  A  H  T  T  Y  F  G  M  T  S  G  A ·
 841  GCTGTGAGGC CCAGGGCGGA CAGGGTGTGA ATAATGCGCA CACGACTTAT TTTGGGATGA CGAGCGGAGC
      · C  T  W  *
 911  CTGTACATGG TGATCAGTCA TTTCAGCCTC CCCGAGTGTA CCAGGAAAGA TGGATGTCCT GGAGAGGGGG
 981  CCGCGTAACC ACTGAAGGAT GAGCTGTAAA GAAGCAGATC GTTCAAACAT TTGGCAATAA AGTTTCTTAA
1051  GATTGAATCC TGTTGCCGGT CTTGCGATGA TTATCATATA ATTTCTGTTG AATTACGTTA AGCATGTAAT
1121  AATTAACATG TAATGCATGA CGTTATTTAT GAGATGGGTT TTTATGATTA GAGTCCCGCA ATTATACATT
1191  TAATACGCGA TAGAAAACAA AATATAGCGC GCAAACTAGG ATAAATTATC GCGCGCGGTG TCATCTATGT
                  HindIII
                  ~~~~~~
            ClaI          XbaI
            ~~~~~~~       ~~~~~~~
1261  TACTAGATCG ATAAGCTTCT AGAGCGGCCG GTGGAGCTCC AATTCGCCCT ATAGTGAGTC GTATTACGCG
1331  CGCTCACTGG CCGTCGTTTT ACAACGTCGT GACTGGGAAA ACCCTGGCGT TACCCAACTT AATCGCCTTG
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1611  CCACGTTCGC CGGCTTTCCC CGTCAAGCTC TAAATCGGGG GCTCCCTTTA GGGTTCCGAT TTAGTGCTTT
1681  ACGGCACCTC GACCCCAAAA AACTTGATTA GGGTGATGGT TCACGTAGTG GGCCATCGCC CTGATAGACG
1751  GTTTTTCGCC CTTTGACGTT GGAGTCCACG TTCTTTAATA GTGGACTCTT GTTCCAAACT GGAACAACAC
```

Figure 35C

```
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1891    TGAGCTGATT TAACAAAAAT TTAACGCGAA TTTTAACAAA ATATTAACGC TTACAATTTA GGTGGCACTT
1961    TTCGGGGAAA TGTGCGCGGA ACCCCTATTT GTTTATTTTT CTAAATACAT TCAAATATGT ATCCGCTCAT
2031    GAGACAATAA CCCTGATAAA TGCTTCAATA ATATTGAAAA AGGAAGAGTA TGAGTATTCA ACATTTCCGT
2101    GTCGCCCTTA TTCCCTTTTT TGCGGCATTT TGCCTTCCTG TTTTTGCTCA CCCAGAAACG CTGGTGAAAG
2171    TAAAAGATGC TGAAGATCAG TTGGGTGCAC GAGTGGGTTA CATCGAACTG GATCTCAACA GCGGTAAGAT
2241    CCTTGAGAGT TTTCGCCCCG AAGAACGTTT TCCAATGATG AGCACTTTTA AAGTTCTGCT ATGTGGCGCG
2311    GTATTATCCC GTATTGACGC CGGGCAAGAG CAACTCGGTC GCCGCATACA CTATTCTCAG AATGACTTGG
2381    TTGAGTACTC ACCAGTCACA GAAAAGCATC TTACGGATGG CATGACAGTA AGAGAATTAT GCAGTGCTGC
2451    CATAACCATG AGTGATAACA CTGCGGCCAA CTTACTTCTG ACAACGATCG GAGGACCGAA GGAGCTAACC
2521    GCTTTTTTGC ACAACATGGG GGATCATGTA ACTCGCCTTG ATCGTTGGGA ACCGGAGCTG AATGAAGCCA
2591    TACCAAACGA CGAGCGTGAC ACCACGATGC CTGTAGCAAT GGCAACAACG TTGCGCAAAC TATTAACTGG
2661    CGAACTACTT ACTCTAGCTT CCCGGCAACA ATTAATAGAC TGGATGGAGG CGGATAAAGT TGCAGGACCA
2731    CTTCTGCGCT CGGCCCTTCC GGCTGGCTGG TTTATTGCTG ATAAATCTGG AGCCGGTGAG CGTGGGTCTC
2801    GCGGTATCAT TGCAGCACTG GGGCCAGATG GTAAGCCCTC CCGTATCGTA GTTATCTACA CGACGGGGAG
2871    TCAGGCAACT ATGGATGAAC GAAATAGACA GATCGCTGAG ATAGGTGCCT CACTGATTAA GCATTGGTAA
2941    CTGTCAGACC AAGTTTACTC ATATATACTT TAGATTGATT TAAAACTTCA TTTTTAATTT AAAAGGATCT
3011    AGGTGAAGAT CCTTTTTGAT AATCTCATGA CCAAAATCCC TTAACGTGAG TTTTCGTTCC ACTGAGCGTC
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3151    ACAAAAAAAC CACCGCTACC AGCGGTGGTT TGTTTGCCGG ATCAAGAGCT ACCAACTCTT TTTCCGAAGG
3221    TAACTGGCTT CAGCAGAGCG CAGATACCAA ATACTGTCCT TCTAGTGTAG CCGTAGTTAG GCCACCACTT
3291    CAAGAACTCT GTAGCACCGC CTACATACCT CGCTCTGCTA ATCCTGTTAC CAGTGGCTGC TGCCAGTGGC
3361    GATAAGTCGT GTCTTACCGG GTTGGACTCA AGACGATAGT TACCGGATAA GGCGCAGCGG TCGGGCTGAA
3431    CGGGGGGTTC GTGCACACAG CCCAGCTTGG AGCGAACGAC CTACACCGAA CTGAGATACC TACAGCGTGA
3501    GCTATGAGAA AGCGCCACGC TTCCCGAAGG GAGAAAGGCG GACAGGTATC CGGTAAGCGG CAGGGTCGGA
3571    ACAGGAGAGC GCACGAGGGA GCTTCCAGGG GGAAACGCCT GGTATCTTTA TAGTCCTGTC GGGTTTCGCC
3641    ACCTCTGACT TGAGCGTCGA TTTTTGTGAT GCTCGTCAGG GGGGCGGAGC CTATGGAAAA ACGCCAGCAA
3711    CGCGGCCTTT TTACGGTTCC TGGCCTTTTG CTGGCCTTTT GCTCACATGT TCTTTCCTGC GTTATCCCCT
3781    GATTCTGTGG ATAACCGTAT TACCGCCTTT GAGTGAGCTG ATACCGCTCG CCGCAGCCGA ACGACCGAGC
3851    GCAGCGAGTC AGTGAGCGAG GAAGCGGAAG AGCGCCCAAT ACGCAAACCG CCTCTCCCCG CGCGTTGGCC
3921    GATTCATTAA TGCAGCTGGC ACGACAGGTT TCCCGACTGG AAAGCGGGCA GTGAGCGCAA CGCAATTAAT
3991    GTGAGTTAGC TCACTCATTA GGCACCCCAG GCTTTACACT TTATGCTTCC GGCTCGTATG TTGTGTGGAA
4061    TTGTGAGCGG ATAACAATTT CACACAGGAA ACAGCTATGA CCATGATTAC GCCAAGCGCG CAATTAACCC
                                  KpnI            XhoI
                                  ~~~~~~~         ~~~~~~
4131    TCACTAAAGG GAACAAAAGC TGGGTACCGG GCCCCCCCTC GAGGTCATTC ATATGCTTGA GAAGAGAGTC
4201    GGGATAGTCC AAAATAAAAC AAAGGTAAGA TTACCTGGTC AAAAGTGAAA ACATCAGTTA AAAGGTGGTA
4271    TAAGTAAAAT ATCGGTAATA AAAGGTGGCC CAAAGTGAAA TTTACTCTTT TCTACTATTA TAAAAATTGA
4341    GGATGTTTTG TCGGTACTTT GATACGTCAT TTTTGTATGA ATTGGTTTTT AAGTTTATTC GCGATTTGGA
4411    AATGCATATC TGTATTTGAG TCGGTTTTTA AGTTCGTTGC TTTTGTAAAT ACAGAGGGAT TTGTATAAGA
                                                                          EcoRI
                                                                          ~
4481    AATATCTTTA AAAAACCCAT ATGCTAATTT GACATAATTT TTGAGAAAAA TATATATTCA GGCGAATTCC
4551    ACAATGAACA ATAATAAGAT TAAAATAGCT TGCCCCCGTT GCAGCGATGG GTATTTTTTC TAGTAAAATA
4621    AAAGATAAAC TTAGACTCAA AACATTTACA AAAACAACCC CTAAAGTCCT AAAGCCCAAA GTGCTATGCA
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4761    CTCCACCCCC GGCACTATCA CCGTGAGTTG TCCGCACCAC CGCACGTCTC GCAGCCAAAA AAAAAAAAAG
4831    AAAGAAAAAA AAGAAAAAGA AAAACAGCAG GTGGGTCCGG GTCGTGGGGG CCGGAAAAGC GAGGAGGATC
4901    GCGAGCAGCG ACGAGGCCCG GCCCTCCCTC CGCTTCCAAA GAAACGCCCC CCATCGCCAC TATATACATA
4971    CCCCCCCCTC TCCTCCCATC CCCCCAACCC TACCACCACC ACCACCACCA CCTCCTCCCC CCTCGCTGCC
5041    GGACGACGAG CTCCTCCCCC CTCCCCCTCC GCCGCCGCCG GTAACCACCC CGCCCCTCTC CTCTTTCTTT
5111    CTCCGTTTTT TTTTTCGTCT CGGTCTCGAT CTTTGGCCTT GGTAGTTTGG GTGGGCGAGA GCGGCTTCGT
                                                                          BamHI
5181    CGCCCAGATC GGTGCGCGGG AGGGGCGGGA TCTCGCGGCT GGCGTCTCCG GGCGTGAGTC GGCCCGGATC
        BamHI                         BglII
        ~                             ~~~~~~~
5251    CTCGCGGGGA ATGGGGCTCT CGGATGTAGA TCTTCTTTCT TTCTTCTTTT TGTGGTAGAA TTTGAATCCC
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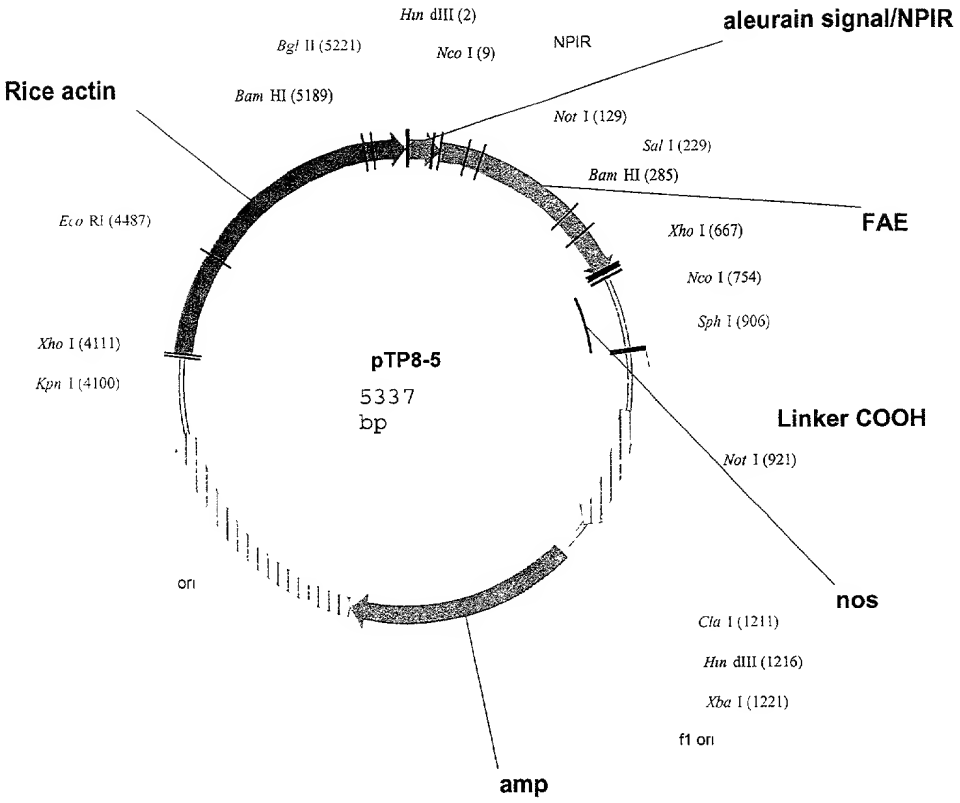
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Bgl II (5221)
Nco I (9)
NPIR
aleurain signal/NPIR
Rice actin
Bam HI (5189)
Not I (129)
Sal I (229)
Bam HI (285)
FAE
Eco RI (4487)
Xho I (667)
Nco I (754)
Sph I (906)
Xho I (4111)
Kpn I (4100)
pTP8-5
5337
bp
Linker COOH
Not I (921)
ori
nos
Cla I (1211)
Hin dIII (1216)
Xba I (1221)
f1 ori
amp

Figure 36 A

Figure 3B

```
                NcoI
               ~~~~~~~
      HindIII
      ~~~~~~
                M  A  H  A  R  V  L  L  L  A  L  A  V  L  A  T  A  A  V  A  V
   1  AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG
                                                                  NotI
                                                                 ~~~~~~~~
      ·  A  S  S  S  S  F  A  D  S  N  P  I  R  P  V  T  D  R  A  A  A  S  T  ·
  71  TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC
      ·  Q  G  I  S  E  D  L  Y  S  R  L  V  E  M  A  T  I  S  Q  A  A  Y  A
 141  GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC TGCCTACGCC
                      SalI
                     ~~~~~~~
       D  L  C  N  I  P  S  T  I  I  K  G  E  K  I  Y  N  S  Q  T  D  I  N  G
 211  GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA TTCTCAAACT GACATTAACG
         BamHI
         ~~~~~~
      ·  W  I  L  R  D  D  S  S  K  E  I  I  T  V  F  R  G  T  G  S  D  T  N  ·
 281  GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA
      ·  L  Q  L  D  T  N  Y  T  L  T  P  F  D  T  L  P  Q  C  N  G  C  E  V
 351  TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC AATGCAACGG TTGTGAAGTA
       H  G  G  Y  Y  I  G  W  V  S  V  Q  D  Q  V  E  S  L  V  K  Q  Q  V  S
 421  CACGGTGGAT ATTATATTGG ATGGGTCTCC GTCCAGGACC AAGTCGAGTC GCTTGTCAAA CAGCAGGTTA
      ·  Q  Y  P  D  Y  A  L  T  V  T  G  H  X  L  G  A  S  L  A  A  L  T  A  ·
 491  GCCAGTATCC GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC TCCCTGGCGG CACTCACTGC
      ·  A  Q  L  S  A  T  Y  D  N  I  R  L  Y  T  F  G  E  P  R  S  G  N  Q
 561  CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC ACCTTCGGCG AACCGCGCAG CGGCAATCAG
                                          XhoI
                                         ~~~~~~~
       A  F  A  S  Y  M  N  D  A  F  Q  A  S  S  P  D  T  T  Q  Y  F  R  V  T
 631  GCCTTCGCGT CGTACATGAA CGATGCCTTC CAAGCCTCGA GCCCAGATAC GACGCAGTAT TTCCGGGTCA
                                                        NcoI
                                                       ~~~~~~~
      ·  H  A  N  D  G  I  P  N  L  P  P  V  E  Q  G  Y  A  H  G  G  V  E  Y  ·
 701  CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC GCCCATGGCG GTGTAGAGTA
      ·  W  S  V  D  P  Y  S  A  Q  N  T  F  V  C  T  G  D  E  V  Q  C  C  E
 771  CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG
                                                                 SphI
                                                                ~~~~
       A  Q  G  G  Q  G  V  N  N  A  H  T  T  Y  F  G  M  T  S  G  A  C  T  W
 841  GCCCAGGGCG GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT GACGAGCGGC GCATGCACCT
             NotI
            ~~~~~~~~~
      ·  P  V  A  A  A  *
 911  GGCCGGTCGC GGCCGCGTAA CCACTGAAGG ATGAGCTGTA AAGAAGCAGA TCGTTCAAAC ATTTGGCAAT
 981  AAAGTTTCTT AAGATTGAAT CCTGTTGCCG GTCTTGCGAT GATTATCATA TAATTTCTGT TGAATTACGT
1051  TAAGCATGTA ATAATTAACA TGTAATGCAT GACGTTATTT ATGAGATGGG TTTTTATGAT TAGAGTCCCG
1121  CAATTATACA TTTAATACGC GATAGAAAAC AAAATATAGC GCGCAAACTA GGATAAATTA TCGCGCGCGG
                                  HindIII
                                 ~~~~~~~
                          ClaI         XbaI
                         ~~~~~~~      ~~~~~~
1191  TGTCATCTAT GTTACTAGAT CGATAAGCTT CTAGAGCGGC CGGTGGAGCT CCAATTCGCC CTATAGTGAG
1261  TCGTATTACG CGCGCTCACT GGCCGTCGTT TTACAACGTC GTGACTGGGA AAACCCTGGC GTTACCCAAC
1331  TTAATCGCCT TGCAGCACAT CCCCCTTTCG CCAGCTGGCG TAATAGCGAA GAGGCCCGCA CCGATCGCCC
1401  TTCCCAACAG TTGCGCAGCC TGAATGGCGA ATGGGACGCG CCCTGTAGCG GCGCATTAAG CGCGGCGGGT
1471  GTGGTGGTTA CGCGCAGCGT GACCGCTACA CTTGCCAGCG CCCTAGCGCC CGCTCCTTTC GCTTTCTTCC
1541  CTTCCTTTCT CGCCACGTTC GCCGGCTTTC CCCGTCAAGC TCTAAATCGG GGGCTCCCTT TAGGGTTCCG
1611  ATTTAGTGCT TTACGGCACC TCGACCCCAA AAAACTTGAT TAGGGTGATG GTTCACGTAG TGGGCCATCG
```

Figure 36C

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1751    CTGGAACAAC ACTCAACCCT ATCTCGGTCT ATTCTTTTGA TTTATAAGGG ATTTTGCCGA TTTCGGCCTA
1821    TTGGTTAAAA AATGAGCTGA TTTAACAAAA ATTTAACGCG AATTTTAACA AAATATTAAC GCTTACAATT
1891    TAGGTGGCAC TTTTCGGGGA AATGTGCGCG GAACCCCTAT TTGTTTATTT TTCTAAATAC ATTCAAATAT
1961    GTATCCGCTC ATGAGACAAT AACCCTGATA AATGCTTCAA TAATATTGAA AAAGGAAGAG TATGAGTATT
2031    CAACATTTCC GTGTCGCCCT TATTCCCTTT TTTGCGGCAT TTTGCCTTCC TGTTTTTGCT CACCCAGAAA
2101    CGCTGGTGAA AGTAAAAGAT GCTGAAGATC AGTTGGGTGC ACGAGTGGGT TACATCGAAC TGGATCTCAA
2171    CAGCGGTAAG ATCCTTGAGA GTTTTCGCCC CGAAGAACGT TTTCCAATGA TGAGCACTTT TAAAGTTCTG
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2381    ATGCAGTGCT GCCATAACCA TGAGTGATAA CACTGCGGCC AACTTACTTC TGACAACGAT CGGAGGACCG
2451    AAGGAGCTAA CCGCTTTTTT GCACAACATG GGGGATCATG TAACTCGCCT TGATCGTTGG GAACCGGAGC
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2591    ACTATTAACT GGCGAACTAC TTACTCTAGC TTCCCGGCAA CAATTAATAG ACTGGATGGA GGCGGATAAA
2661    GTTGCAGGAC CACTTCTGCG CTCGGCCCTT CCGGCTGGCT GGTTTATTGC TGATAAATCT GGAGCCGGTG
2731    AGCGTGGGTC TCGCGGTATC ATTGCAGCAC TGGGGCCAGA TGGTAAGCCC TCCCGTATCG TAGTTATCTA
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2871    AAGCATTGGT AACTGTCAGA CCAAGTTTAC TCATATATAC TTTAGATTGA TTTAAAACTT CATTTTTAAT
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3011    CCACTGAGCG TCAGACCCCG TAGAAAAGAT CAAAGGATCT TCTTGAGATC CTTTTTTTCT GCGCGTAATC
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3151    TTTTTCCGAA GGTAACTGGC TTCAGCAGAG CGCAGATACC AAATACTGTC CTTCTAGTGT AGCCGTAGTT
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3991    TGTTGTGTGG AATTGTGAGC GGATAACAAT TTCACACAGG AAACAGCTAT GACCATGATT ACGCCAAGCG
                                              KpnI            XhoI
                                              ~~~~~~~         ~~~~~~
4061    CGCAATTAAC CCTCACTAAA GGGAACAAAA GCTGGGTACC GGGCCCCCCC TCGAGGTCAT TCATATGCTT
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             EcoRI
             ~~~~~~~
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4551    TCTAGTAAAA TAAAAGATAA ACTTAGACTC AAAACATTTA CAAAAACAAC CCCTAAAGTC CTAAAGCCCA
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4971    CCCCTCGCTG CCGGACGACG AGCTCCTCCC CCCTCCCCCT CCGCCGCCGC CGGTAACCAC CCCGCCCCTC
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             BamHI                                  BglII
             ~~~~~~~                                ~~~~~~
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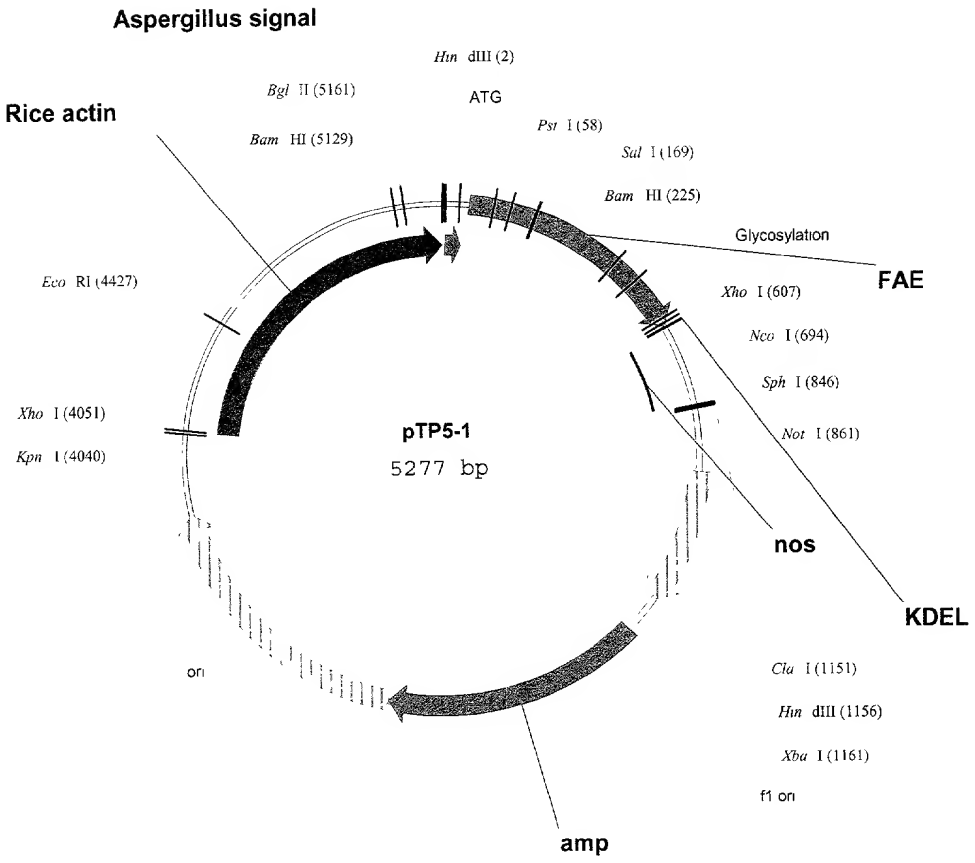
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Nco I (694)
Sph I (846)
Xho I (4051)
Not I (861)
Kpn I (4040)
pTP5-1
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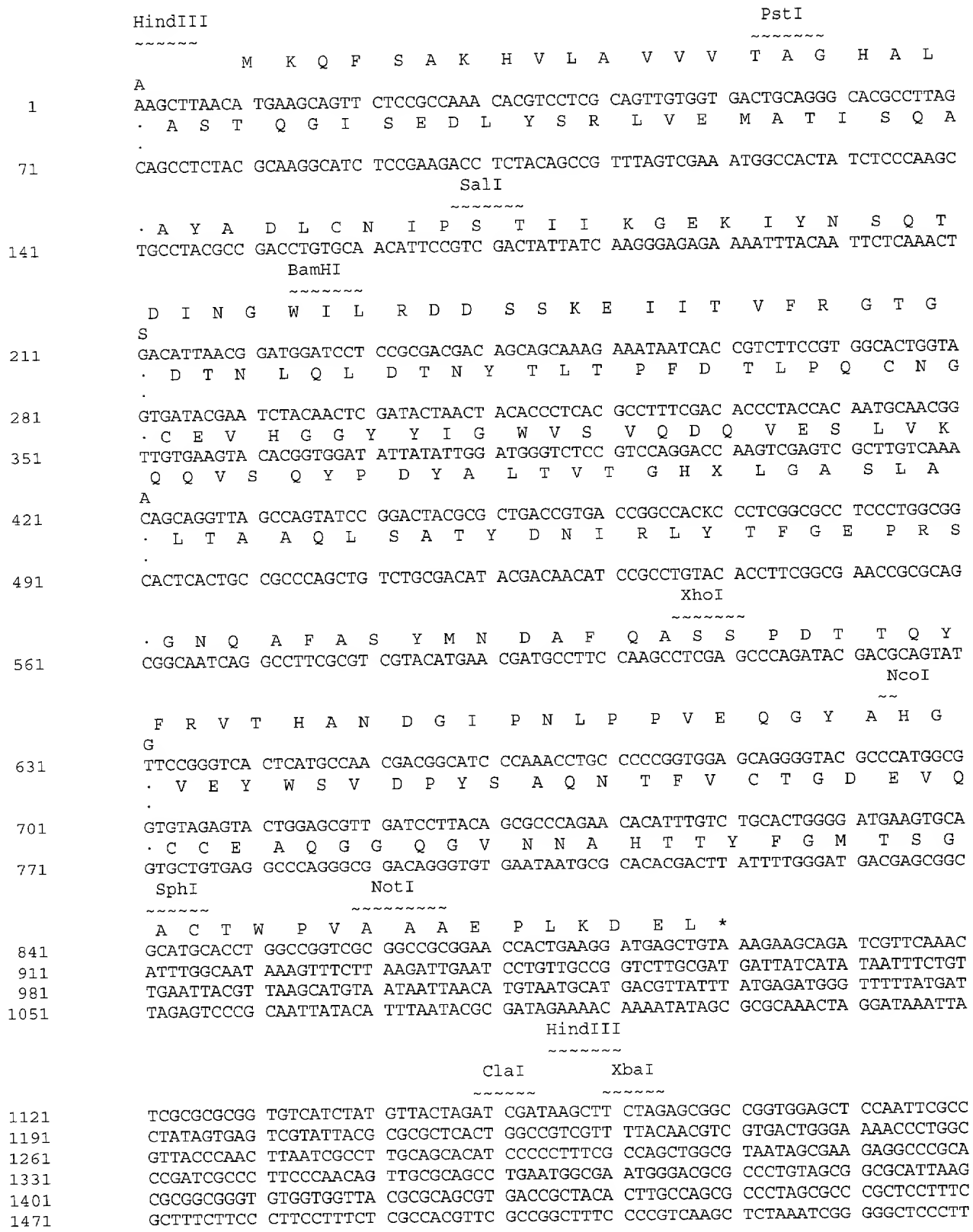
KDEL
ori
Cla I (1151)
Hin dIII (1156)
Xba I (1161)
f1 on
amp

Figure 37A

Figure 32 B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·
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SalI
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BamHI
D I N G W I L R D D S S K E I I T V F R G T G
S
211 GACATTAACG GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA
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·
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· C E V H G G Y Y I G W V S V Q D Q V E S L V K
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A
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XhoI
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NcoI
F R V T H A N D G I P N L P P V E Q G Y A H G
G
631 TTCCGGGTCA CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC GCCCATGGCG
· V E Y W S V D P Y S A Q N T F V C T G D E V Q
·
701 GTGTAGAGTA CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA
· C C E A Q G G Q G V N N A H T T Y F G M T S G
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SphI
NotI
A C T W P V A A A E P L K D E L *
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HindIII
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1401 CGCGGCGGGT GTGGTGGTTA CGCGCAGCGT GACCGCTACA CTTGCCAGCG CCCTAGCGCC CGCTCCTTTC
1471 GCTTTCTTCC CTTCCTTTCT CGCCACGTTC GCCGGCTTTC CCCGTCAAGC TCTAAATCGG GGGCTCCCTT

Figure 37C

```
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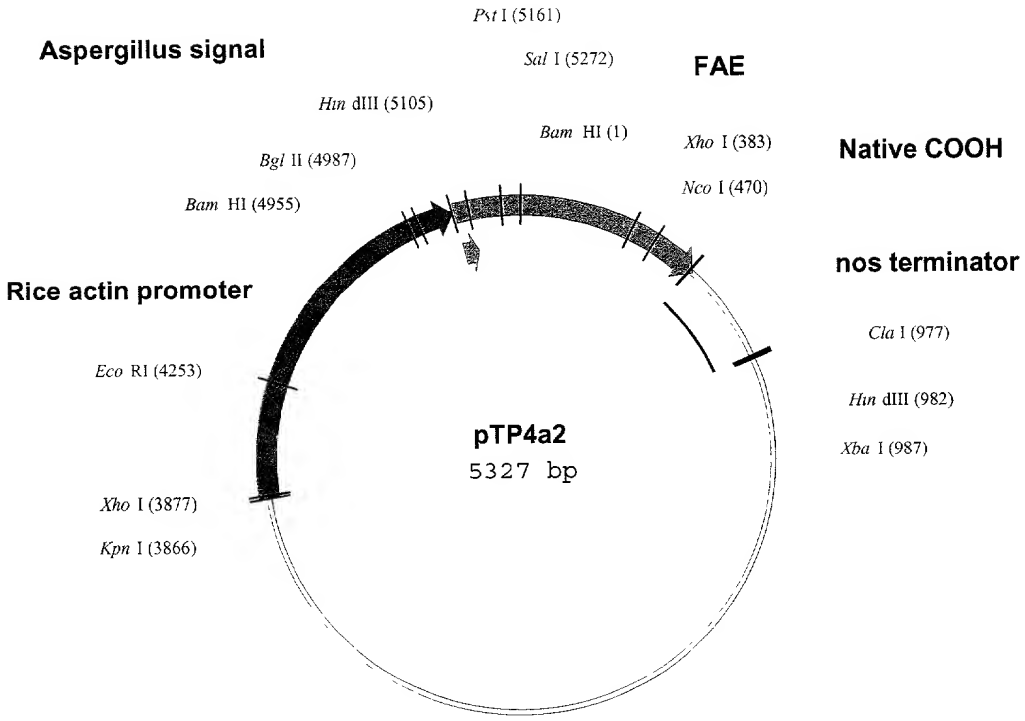
1611  TGGGCCATCG CCCTGATAGA CGGTTTTTCG CCCTTTGACG TTGGAGTCCA CGTTCTTTAA TAGTGGACTC
1681  TTGTTCCAAA CTGGAACAAC ACTCAACCCT ATCTCGGTCT ATTCTTTTGA TTTATAAGGG ATTTTGCCGA
1751  TTTCGGCCTA TTGGTTAAAA AATGAGCTGA TTTAACAAAA ATTTAACGCG AATTTTAACA AAATATTAAC
1821  GCTTACAATT TAGGTGGCAC TTTTCGGGGA AATGTGCGCG GAACCCCTAT TTGTTTATTT TTCTAAATAC
1891  ATTCAAATAT GTATCCGCTC ATGAGACAAT AACCCTGATA AATGCTTCAA TAATATTGAA AAAGGAAGAG
1961  TATGAGTATT CAACATTTCC GTGTCGCCCT TATTCCCTTT TTTGCGGCAT TTTGCCTTCC TGTTTTTGCT
2031  CACCCAGAAA CGCTGGTGAA AGTAAAAGAT GCTGAAGATC AGTTGGGTGC ACGAGTGGGT TACATCGAAC
2101  TGGATCTCAA CAGCGGTAAG ATCCTTGAGA GTTTTCGCCC CGAAGAACGT TTTCCAATGA TGAGCACTTT
2171  TAAAGTTCTG CTATGTGGCG CGGTATTATC CCGTATTGAC GCCGGGCAAG AGCAACTCGG TCGCCGCATA
2241  CACTATTCTC AGAATGACTT GGTTGAGTAC TCACCAGTCA CAGAAAAGCA TCTTACGGAT GGCATGACAG
2311  TAAGAGAATT ATGCAGTGCT GCCATAACCA TGAGTGATAA CACTGCGGCC AACTTACTTC TGACAACGAT
2381  CGGAGGACCG AAGGAGCTAA CCGCTTTTTT GCACAACATG GGGGATCATG TAACTCGCCT TGATCGTTGG
2451  GAACCGGAGC TGAATGAAGC CATACCAAAC GACGAGCGTG ACACCACGAT GCCTGTAGCA ATGGCAACAA
2521  CGTTGCGCAA ACTATTAACT GGCGAACTAC TTACTCTAGC TTCCCGGCAA CAATTAATAG ACTGGATGGA
2591  GGCGGATAAA GTTGCAGGAC CACTTCTGCG CTCGGCCCTT CCGGCTGGCT GGTTTATTGC TGATAAATCT
2661  GGAGCCGGTG AGCGTGGGTC TCGCGGTATC ATTGCAGCAC TGGGGCCAGA TGGTAAGCCC TCCCGTATCG
2731  TAGTTATCTA CACGACGGGG AGTCAGGCAA CTATGGATGA ACGAAATAGA CAGATCGCTG AGATAGGTGC
2801  CTCACTGATT AAGCATTGGT AACTGTCAGA CCAAGTTTAC TCATATATAC TTTAGATTGA TTTAAAACTT
2871  CATTTTTAAT TTAAAAGGAT CTAGGTGAAG ATCCTTTTTG ATAATCTCAT GACCAAAATC CCTTAACGTG
2941  AGTTTTCGTT CCACTGAGCG TCAGACCCCG TAGAAAAGAT CAAAGGATCT TCTTGAGATC CTTTTTTTCT
3011  GCGCGTAATC TGCTGCTTGC AAACAAAAAA ACCACCGCTA CCAGCGGTGG TTTGTTTGCC GGATCAAGAG
3081  CTACCAACTC TTTTTCCGAA GGTAACTGGC TTCAGCAGAG CGCAGATACC AAATACTGTC CTTCTAGTGT
3151  AGCCGTAGTT AGGCCACCAC TTCAAGAACT CTGTAGCACC GCCTACATAC CTCGCTCTGC TAATCCTGTT
3221  ACCAGTGGCT GCTGCCAGTG GCGATAAGTC GTGTCTTACC GGGTTGGACT CAAGACGATA GTTACCGGAT
3291  AAGGCGCAGC GGTCGGGCTG AACGGGGGGT TCGTGCACAC AGCCCAGCTT GGAGCGAACG ACCTACACCG
3361  AACTGAGATA CCTACAGCGT GAGCTATGAG AAAGCGCCAC GCTTCCCGAA GGGAGAAAGG CGGACAGGTA
3431  TCCGGTAAGC GGCAGGGTCG GAACAGGAGA GCGCACGAGG GAGCTTCCAG GGGGAAACGC CTGGTATCTT
3501  TATAGTCCTG TCGGGTTTCG CCACCTCTGA CTTGAGCGTC GATTTTTGTG ATGCTCGTCA GGGGGGCGGA
3571  GCCTATGGAA AAACGCCAGC AACGCGGCCT TTTTACGGTT CCTGGCCTTT TGCTGGCCTT TTGCTCACAT
3641  GTTCTTTCCT GCGTTATCCC CTGATTCTGT GGATAACCGT ATTACCGCCT TTGAGTGAGC TGATACCGCT
3711  CGCCGCAGCC GAACGACCGA GCGCAGCGAG TCAGTGAGCG AGGAAGCGGA AGAGCGCCCA ATACGCAAAC
3781  CGCCTCTCCC CGCGCGTTGG CCGATTCATT AATGCAGCTG GCACGACAGG TTTCCCGACT GGAAAGCGGG
3851  CAGTGAGCGC AACGCAATTA ATGTGAGTTA GCTCACTCAT TAGGCACCCC AGGCTTTACA CTTTATGCTT
3921  CCGGCTCGTA TGTTGTGTGG AATTGTGAGC GGATAACAAT TTCACACAGG AAACAGCTAT GACCATGATT
                                                    KpnI            XhoI
                                                    ~~~~~~~         ~~~~~~
3991  ACGCCAAGCG CGCAATTAAC CCTCACTAAA GGGAACAAAA GCTGGGTACC GGGCCCCCCC TCGAGGTCAT
4061  TCATATGCTT GAGAAGAGAG TCGGGATAGT CCAAAATAAA ACAAAGGTAA GATTACCTGG TCAAAAGTGA
4131  AAACATCAGT TAAAAGGTGG TATAAGTAAA ATATCGGTAA TAAAAGGTGG CCCAAAGTGA AATTTACTCT
4201  TTTCTACTAT TATAAAAATT GAGGATGTTT TGTCGGTACT TTGATACGTC ATTTTTGTAT GAATTGGTTT
4271  TTAAGTTTAT TCGCGATTTG GAAATGCATA TCTGTATTTG AGTCGGTTTT TAAGTTCGTT GCTTTTGTAA
4341  ATACAGAGGG ATTTGTATAA GAAATATCTT TAAAAAACCC ATATGCTAAT TTGACATAAT TTTTGAGAAA
                    EcoRI
                    ~~~~~~~
4411  AATATATATT CAGGCGAATT CCACAATGAA CAATAATAAG ATTAAAATAG CTTGCCCCCG TTGCAGCGAT
4481  GGGTATTTTT TCTAGTAAAA TAAAAGATAA ACTTAGACTC AAAACATTTA CAAAAACAAC CCCTAAAGTC
4551  CTAAAGCCCA AAGTGCTATG CACGATCCAT AGCAAGCCCA GCCCAACCCA ACCCAACCCA ACCCACCCCA
4621  GTGCAGCCAA CTGGCAAATA GTCTCCACCC CCGGCACTAT CACCGTGAGT TGTCCGCACC ACCGCACGTC
4691  TCGCAGCCAA AAAAAAAAAA AGAAAGAAAA AAAAGAAAAA GAAAAACAGC AGGTGGGTCC GGGTCGTGGG
4761  GGCCGGAAAA GCGAGGAGGA TCGCGAGCAG CGACGAGGCC CGGCCCTCCC TCCGCTTCCA AAGAAACGCC
4831  CCCCATCGCC ACTATATACA TACCCCCCCC TCTCCTCCCA TCCCCCCAAC CCTACCACCA CCACCACCAC
4901  CACCTCCTCC CCCCTCGCTG CCGGACGACG AGCTCCTCCC CCCTCCCCCT CCGCCGCCGC CGGTAACCAC
4971  CCCGCCCCTC TCCTCTTTCT TTCTCCGTTT TTTTTTTCGT CTCGGTCTCG ATCTTTGGCC TTGGTAGTTT
5041  GGGTGGGCGA GAGCGGCTTC GTCGCCCAGA TCGGTGCGCG GGAGGGGCGG GATCTCGCGG CTGGCGTCTC
                        BamHI                                   BglII
                        ~~~~~~~                                 ~~~~~~
5111  CGGGCGTGAG TCGGCCCGGA TCCTCGCGGG GAATGGGGCT CTCGGATGTA GATCTTCTTT CTTTCTTCTT
5181  TTTGTGGTAG AATTTGAATC CCTCAGCATT GTTCATCGGT AGTTTTTCTT TTCATGATTT GTGACAAATG
5251  CAGCCTCGTG CGGAGCTTTT TTGTAGC
```

Figure 38 A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Sal I (5272)
FAE
Hin dIII (5105)
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Xho I (383)
Native COOH
Bgl II (4987)
Nco I (470)
Bam HI (4955)
nos terminator
Rice actin promoter
Cla I (977)
Eco RI (4253)
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pTP4a2
5327 bp
Xba I (987)
Xho I (3877)
Kpn I (3866)

Figure 38 B

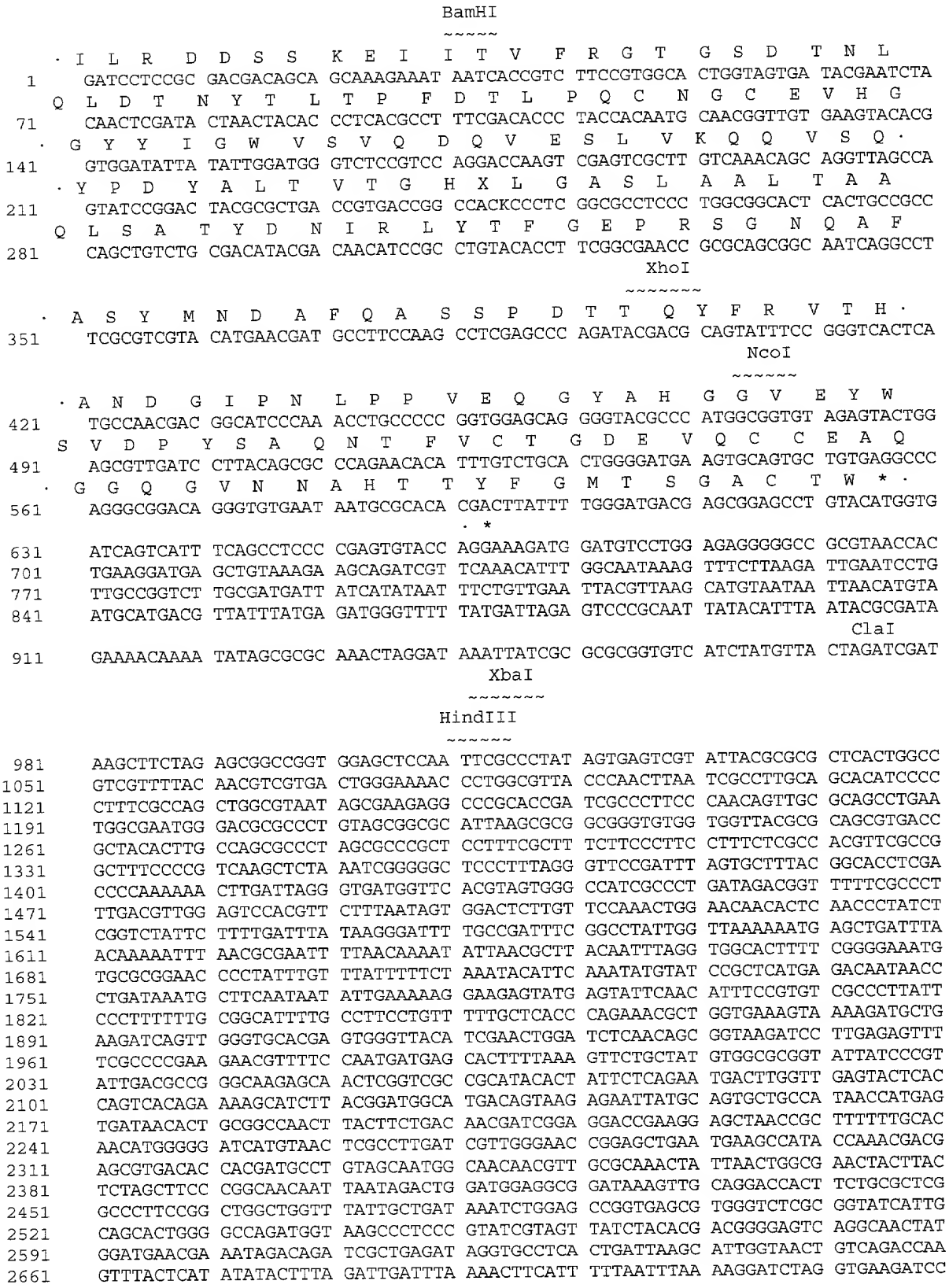

Figure 38 C

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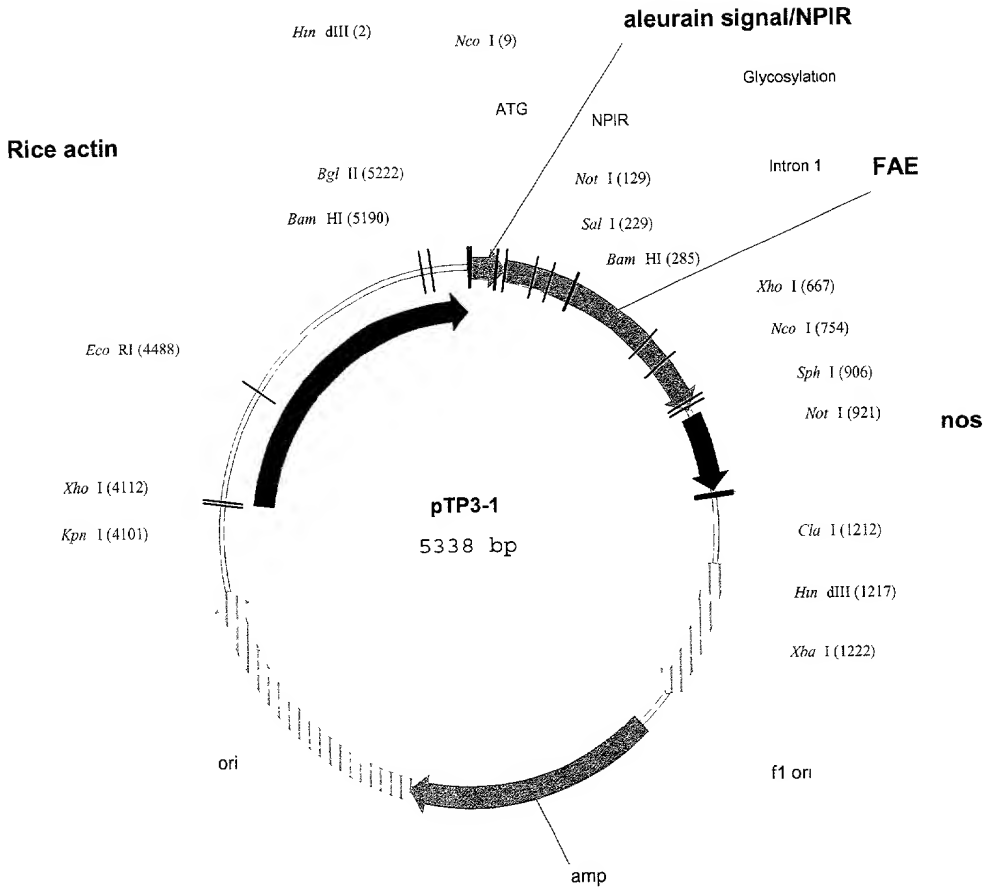
2801    AAAGATCAAA GGATCTTCTT GAGATCCTTT TTTTCTGCGC GTAATCTGCT GCTTGCAAAC AAAAAAACCA
2871    CCGCTACCAG CGGTGGTTTG TTTGCCGGAT CAAGAGCTAC CAACTCTTTT TCCGAAGGTA ACTGGCTTCA
2941    GCAGAGCGCA GATACCAAAT ACTGTCCTTC TAGTGTAGCC GTAGTTAGGC CACCACTTCA AGAACTCTGT
3011    AGCACCGCCT ACATACCTCG CTCTGCTAAT CCTGTTACCA GTGGCTGCTG CCAGTGGCGA TAAGTCGTGT
3081    CTTACCGGGT TGGACTCAAG ACGATAGTTA CCGGATAAGG CGCAGCGGTC GGGCTGAACG GGGGGTTCGT
3151    GCACACAGCC CAGCTTGGAG CGAACGACCT ACACCGAACT GAGATACCTA CAGCGTGAGC TATGAGAAAG
3221    CGCCACGCTT CCCGAAGGGA GAAAGGCGGA CAGGTATCCG GTAAGCGGCA GGGTCGGAAC AGGAGAGCGC
3291    ACGAGGGAGC TTCCAGGGGG AAACGCCTGG TATCTTTATA GTCCTGTCGG GTTTCGCCAC CTCTGACTTG
3361    AGCGTCGATT TTTGTGATGC TCGTCAGGGG GGCGGAGCCT ATGGAAAAAC GCCAGCAACG CGGCCTTTTT
3431    ACGGTTCCTG GCCTTTTGCT GGCCTTTTGC TCACATGTTC TTTCCTGCGT TATCCCCTGA TTCTGTGGAT
3501    AACCGTATTA CCGCCTTTGA GTGAGCTGAT ACCGCTCGCC GCAGCCGAAC GACCGAGCGC AGCGAGTCAG
3571    TGAGCGAGGA AGCGGAAGAG CGCCCAATAC GCAAACCGCC TCTCCCCGCG CGTTGGCCGA TTCATTAATG
3641    CAGCTGGCAC GACAGGTTTC CCGACTGGAA AGCGGGCAGT GAGCGCAACG CAATTAATGT GAGTTAGCTC
3711    ACTCATTAGG CACCCCAGGC TTTACACTTT ATGCTTCCGG CTCGTATGTT GTGTGGAATT GTGAGCGGAT
3781    AACAATTTCA CACAGGAAAC AGCTATGACC ATGATTACGC CAAGCGCGCA ATTAACCCTC ACTAAAGGGA
                                  KpnI          XhoI
                                  ~~~~~~        ~~~~~~~
3851    ACAAAAGCTG GGTACCGGGC CCCCCCTCGA GGTCATTCAT ATGCTTGAGA AGAGAGTCGG GATAGTCCAA
3921    AATAAAACAA AGGTAAGATT ACCTGGTCAA AAGTGAAAAC ATCAGTTAAA AGGTGGTATA AGTAAAATAT
3991    CGGTAATAAA AGGTGGCCCA AAGTGAAATT TACTCTTTTC TACTATTATA AAAATTGAGG ATGTTTTGTC
4061    GGTACTTTGA TACGTCATTT TTGTATGAAT TGGTTTTTAA GTTTATTCGC GATTTGGAAA TGCATATCTG
4131    TATTTGAGTC GGTTTTTAAG TTCGTTGCTT TTGTAAATAC AGAGGGATTT GTATAAGAAA TATCTTTAAA
                                                                    EcoRI
                                                                    ~~~~~~~
4201    AAACCCATAT GCTAATTTGA CATAATTTTT GAGAAAAATA TATATTCAGG CGAATTCCAC AATGAACAAT
4271    AATAAGATTA AAATAGCTTG CCCCCGTTGC AGCGATGGGT ATTTTTTCTA GTAAAATAAA AGATAAACTT
4341    AGACTCAAAA CATTTACAAA AACAACCCCT AAAGTCCTAA AGCCCAAAGT GCTATGCACG ATCCATAGCA
4411    AGCCCAGCCC AACCCAACCC AACCCAACCC ACCCCAGTGC AGCCAACTGG CAAATAGTCT CCACCCCCGG
4481    CACTATCACC GTGAGTTGTC CGCACCACCG CACGTCTCGC AGCCAAAAAA AAAAAAAGAA AGAAAAAAAA
4551    GAAAAAGAAA AACAGCAGGT GGGTCCGGGT CGTGGGGGCC GGAAAAGCGA GGAGGATCGC GAGCAGCGAC
4621    GAGGCCCGGC CCTCCCTCCG CTTCCAAAGA AACGCCCCCC ATCGCCACTA TATACATACC CCCCCCTCTC
4691    CTCCCATCCC CCCAACCCTA CCACCACCAC CACCACCACC TCCTCCCCCC TCGCTGCCGG ACGACGAGCT
4761    CCTCCCCCCT CCCCCTCCGC CGCCGCCGGT AACCACCCCG CCCCTCTCCT CTTTCTTTCT CCGTTTTTTT
4831    TTTCGTCTCG GTCTCGATCT TTGGCCTTGG TAGTTTGGGT GGGCGAGAGC GGCTTCGTCG CCCAGATCGG
                                                                      BamHI
                                                                      ~~~~~~~
4901    TGCGCGGGAG GGGCGGGATC TCGCGGCTGG CGTCTCCGGG CGTGAGTCGG CCCGGATCCT CGCGGGGAAT
                                                  BglII
                                                  ~~~~~~~
4971    GGGGCTCTCG GATGTAGATC TTCTTTCTTT CTTCTTTTTG TGGTAGAATT TGAATCCCTC AGCATTGTTC
                                                                        HindIII
                                                                        ~
5041    ATCGGTAGTT TTTCTTTTCA TGATTTGTGA CAAATGCAGC CTCGTGCGGA GCTTTTTTGT AGCAAGCTTA
                                                                    PstI
                                                                    ~~~~~~~
          M  K  Q   F  S  A   K  H  V  L   A  V  V   V  T  A   G  H  A  L   A  A  S  ·
5111    ACATGAAGCA GTTCTCCGCC AAACACGTCC TCGCAGTTGT GGTGACTGCA GGGCACGCCT TAGCAGCCTC
          ·  T  Q  G   I  S  E  D   L  Y  S   R  L  V   E  M  A  T   I  S  Q   A  A  Y
5181    TACGCAAGGC ATCTCCGAAG ACCTCTACAG CCGTTTAGTC GAAATGGCCA CTATCTCCCA AGCTGCCTAC
                                                  SalI
                                                  ~~~~~~
          A  D  L  C   N  I  P   S  T  I   I  K  G  E   K  I  Y   N  S  Q   T  D  I  N
5251    GCCGACCTGT GCAACATTCC GTCGACTATT ATCAAGGGAG AGAAAATTTA CAATTCTCAA ACTGACATTA
                                                  B
                                                  ~
                                               ·  G  W
5321                                           ACGGATG
```

Figure 39 A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Hin dIII (2)
Nco I (9)
Glycosylation
ATG
NPIR
Rice actin
Bgl II (5222)
Not I (129)
Intron 1
FAE
Bam HI (5190)
Sal I (229)
Bam HI (285)
Xho I (667)
Nco I (754)
Eco RI (4488)
Sph I (906)
Not I (921)
nos
Xho I (4112)
pTP3-1
5338 bp
Kpn I (4101)
Cla I (1212)
Hin dIII (1217)
Xba I (1222)
ori
f1 ori
amp

Figure 39 B

```
                NcoI
               ~~~~~~~
        HindIII
        ~~~~~~
                  M  A  H  A  R  V  L  L  L  A  L  A  V  L  A  T  A  A  V  A  V
    1   AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG

                                                NPIR                    NotI
                                               ~~~~~~~~~~~~~~          ~~~~~~~~
        ·  A  S  S  S  S  F  A  D  S  N  P  I  R  P  V  T  D  R  A  A  A  S  T  ·
   71   TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC
        ·  Q  G  I  S  E  D  L  Y  S  R  L  V  E  M  A  T  I  S  Q  A  A  Y  A
  141   GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC TGCCTACGCC

                          SalI
                         ~~~~~~~
         D  L  C  N  I  P  S  T  I  I  K  G  E  K  I  Y  N  S  Q  T  D  I  N  G
  211   GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA TTCTCAAACT GACATTAACG

           BamHI
           ~~~~~~
        ·  W  I  L  R  D  D  S  S  K  E  I  I  T  V  F  R  G  T  G  S  D  T  N  ·
  281   GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA

                        Glycosylation
                        ~~~~
        ·  L  Q  L  D  T  N  Y  T  L  T  P  F  D  T  L  P  Q  C  N  G  C  E  V
  351   TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC AATGCAACGG TTGTGAAGTA
         H  G  G  Y  Y  I  G  W  V  S  V  Q  D  Q  V  E  S  L  V  K  Q  Q  V  S
  421   CACGGTGGAT ATTATATTGG ATGGGTCTCC GTCCAGGACC AAGTCGAGTC GCTTGTCAAA CAGCAGGTTA
        ·  Q  Y  P  D  Y  A  L  T  V  T  G  H  X  L  G  A  S  L  A  A  L  T  A  ·
  491   GCCAGTATCC GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC TCCCTGGCGG CACTCACTGC
        ·  A  Q  L  S  A  T  Y  D  N  I  R  L  Y  T  F  G  E  P  R  S  G  N  Q
  561   CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC ACCTTCGGCG AACCGCGCAG CGGCAATCAG

                                                XhoI
                                               ~~~~~~~
         A  F  A  S  Y  M  N  D  A  F  Q  A  S  S  P  D  T  T  Q  Y  F  R  V  T
  631   GCCTTCGCGT CGTACATGAA CGATGCCTTC CAAGCCTCGA GCCCAGATAC GACGCAGTAT TTCCGGGTCA

                                                                NcoI
                                                               ~~~~~~~
        ·  H  A  N  D  G  I  P  N  L  P  P  V  E  Q  G  Y  A  H  G  G  V  E  Y  ·
  701   CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC GCCCATGGCG GTGTAGAGTA
        ·  W  S  V  D  P  Y  S  A  Q  N  T  F  V  C  T  G  D  E  V  Q  C  C  E
  771   CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG

                                                                      SphI
                                                                     ~~~~
         A  Q  G  G  Q  G  V  N  N  A  H  T  T  Y  F  G  M  T  S  G  A  C  T  W
  841   GCCCAGGGCG GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT GACGAGCGGC GCATGCACCT
```

Figure 39 C

```
                    NotI                                KDEL
                  ~~~~~~~~~                         ~~~~~~~~~~~~~~~
              .  P  V  A   A  A  E   T  T  E  G   *
 911  GGCCGGTCGC GGCCGCGGAA ACCACTGAAG GATGAGCTGT AAAGAAGCAG ATCGTTCAAA CATTTGGCAA
 981  TAAAGTTTCT TAAGATTGAA TCCTGTTGCC GGTCTTGCGA TGATTATCAT ATAATTTCTG TTGAATTACG
1051  TTAAGCATGT AATAATTAAC ATGTAATGCA TGACGTTATT TATGAGATGG GTTTTTATGA TTAGAGTCCC
1121  GCAATTATAC ATTTAATACG CGATAGAAAA CAAAATATAG CGCGCAAACT AGGATAAATT ATCGCGCGCG

                                    HindIII
                                    ~~~~~~~
                              ClaI          XbaI
                            ~~~~~~        ~~~~~~
1191  GTGTCATCTA TGTTACTAGA TCGATAAGCT TCTAGAGCGG CCGGTGGAGC TCCAATTCGC CCTATAGTGA
1261  GTCGTATTAC GCGCGCTCAC TGGCCGTCGT TTTACAACGT CGTGACTGGG AAAACCCTGG CGTTACCCAA
1331  CTTAATCGCC TTGCAGCACA TCCCCCTTTC GCCAGCTGGC GTAATAGCGA AGAGGCCCGC ACCGATCGCC
1401  CTTCCCAACA GTTGCGCAGC CTGAATGGCG AATGGGACGC GCCCTGTAGC GGCGCATTAA GCGCGGCGGG
1471  TGTGGTGGTT ACGCGCAGCG TGACCGCTAC ACTTGCCAGC GCCCTAGCGC CCGCTCCTTT CGCTTTCTTC
1541  CCTTCCTTTC TCGCCACGTT CGCCGGCTTT CCCCGTCAAG CTCTAAATCG GGGGCTCCCT TTAGGGTTCC
1611  GATTTAGTGC TTTACGGCAC CTCGACCCCA AAAAACTTGA TTAGGGTGAT GGTTCACGTA GTGGGCCATC
1681  GCCCTGATAG ACGGTTTTTC GCCCTTTGAC GTTGGAGTCC ACGTTCTTTA ATAGTGGACT CTTGTTCCAA
1751  ACTGGAACAA CACTCAACCC TATCTCGGTC TATTCTTTTG ATTTATAAGG GATTTTGCCG ATTTCGGCCT
1821  ATTGGTTAAA AAATGAGCTG ATTTAACAAA AATTTAACGC GAATTTTAAC AAAATATTAA CGCTTACAAT
1891  TTAGGTGGCA CTTTTCGGGG AAATGTGCGC GGAACCCCTA TTTGTTTATT TTTCTAAATA CATTCAAATA
1961  TGTATCCGCT CATGAGACAA TAACCCTGAT AAATGCTTCA ATAATATTGA AAAAGGAAGA GTATGAGTAT
2031  TCAACATTTC CGTGTCGCCC TTATTCCCTT TTTTGCGGCA TTTTGCCTTC CTGTTTTTGC TCACCCAGAA
2101  ACGCTGGTGA AAGTAAAAGA TGCTGAAGAT CAGTTGGGTG CACGAGTGGG TTACATCGAA CTGGATCTCA
2171  ACAGCGGTAA GATCCTTGAG AGTTTTCGCC CCGAAGAACG TTTTCCAATG ATGAGCACTT TTAAAGTTCT
2241  GCTATGTGGC GCGGTATTAT CCCGTATTGA CGCCGGGCAA GAGCAACTCG GTCGCCGCAT ACACTATTCT
2311  CAGAATGACT TGGTTGAGTA CTCACCAGTC ACAGAAAAGC ATCTTACGGA TGGCATGACA GTAAGAGAAT
2381  TATGCAGTGC TGCCATAACC ATGAGTGATA ACACTGCGGC CAACTTACTT CTGACAACGA TCGGAGGACC
2451  GAAGGAGCTA ACCGCTTTTT TGCACAACAT GGGGGATCAT GTAACTCGCC TTGATCGTTG GGAACCGGAG
2521  CTGAATGAAG CCATACCAAA CGACGAGCGT GACACCACGA TGCCTGTAGC AATGGCAACA ACGTTGCGCA
2591  AACTATTAAC TGGCGAACTA CTTACTCTAG CTTCCCGGCA ACAATTAATA GACTGGATGG AGGCGGATAA
2661  AGTTGCAGGA CCACTTCTGC GCTCGGCCCT TCCGGCTGGC TGGTTTATTG CTGATAAATC TGGAGCCGGT
2731  GAGCGTGGGT CTCGCGGTAT CATTGCAGCA CTGGGGCCAG ATGGTAAGCC CTCCCGTATC GTAGTTATCT
2801  ACACGACGGG GAGTCAGGCA ACTATGGATG AACGAAATAG ACAGATCGCT GAGATAGGTG CCTCACTGAT
2871  TAAGCATTGG TAACTGTCAG ACCAAGTTTA CTCATATATA CTTTAGATTG ATTTAAAACT TCATTTTTAA
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3011  TCCACTGAGC GTCAGACCCC GTAGAAAAGA TCAAAGGATC TTCTTGAGAT CCTTTTTTTC TGCGCGTAAT
3081  CTGCTGCTTG CAAACAAAAA AACCACCGCT ACCAGCGGTG GTTTGTTTGC CGGATCAAGA GCTACCAACT
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3291  TGCTGCCAGT GGCGATAAGT CGTGTCTTAC CGGGTTGGAC TCAAGACGAT AGTTACCGGA TAAGGCGCAG
3361  CGGTCGGGCT GAACGGGGGG TTCGTGCACA CAGCCCAGCT TGGAGCGAAC GACCTACACC GAACTGAGAT
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3571  GTCGGGTTTC GCCACCTCTG ACTTGAGCGT CGATTTTTGT GATGCTCGTC AGGGGGGCGG AGCCTATGGA
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3781  CGAACGACCG AGCGCAGCGA GTCAGTGAGC GAGGAAGCGG AAGAGCGCCC AATACGCAAA CCGCCTCTCC
3851  CCGCGCGTTG GCCGATTCAT TAATGCAGCT GGCACGACAG GTTTCCCGAC TGGAAAGCGG GCAGTGAGCG
3921  CAACGCAATT AATGTGAGTT AGCTCACTCA TTAGGCACCC CAGGCTTTAC ACTTTATGCT TCCGGCTCGT
```

Figure 39 D

```
3991   ATGTTGTGTG GAATTGTGAG CGGATAACAA TTTCACACAG GAAACAGCTA TGACCATGAT TACGCCAAGC
                                              KpnI              XhoI
                                              ~~~~~~~           ~~~~~~~
4061   GCGCAATTAA CCCTCACTAA AGGGAACAAA AGCTGGGTAC CGGGCCCCCC CTCGAGGTCA TTCATATGCT
4131   TGAGAAGAGA GTCGGGATAG TCCAAAATAA AACAAAGGTA AGATTACCTG GTCAAAAGTG AAAACATCAG
4201   TTAAAAGGTG GTATAAGTAA AATATCGGTA ATAAAAGGTG GCCCAAAGTG AAATTTACTC TTTTCTACTA
4271   TTATAAAAAT TGAGGATGTT TTGTCGGTAC TTTGATACGT CATTTTTGTA TGAATTGGTT TTTAAGTTTA
4341   TTCGCGATTT GGAAATGCAT ATCTGTATTT GAGTCGGTTT TTAAGTTCGT TGCTTTTGTA AATACAGAGG
4411   GATTTGTATA AGAAATATCT TTAAAAAACC CATATGCTAA TTTGACATAA TTTTTGAGAA AAATATATAT
             EcoRI
             ~~~~~~~
4481   TCAGGCGAAT TCCACAATGA ACAATAATAA GATTAAAATA GCTTGCCCCC GTTGCAGCGA TGGGTATTTT
4551   TTCTAGTAAA ATAAAAGATA AACTTAGACT CAAAACATTT ACAAAAACAA CCCCTAAAGT CCTAAAGCCC
4621   AAAGTGCTAT GCACGATCCA TAGCAAGCCC AGCCCAACCC AACCCAACCC AACCCACCCC AGTGCAGCCA
4691   ACTGGCAAAT AGTCTCCACC CCCGGCACTA TCACCGTGAG TTGTCCGCAC CACCGCACGT CTCGCAGCCA
4761   AAAAAAAAAA AAGAAAGAAA AAAAAGAAAA AGAAAAACAG CAGGTGGGTC CGGGTCGTGG GGGCCGGAAA
4831   AGCGAGGAGG ATCGCGAGCA GCGACGAGGC CCGGCCCTCC CTCCGCTTCC AAAGAAACGC CCCCCATCGC
4901   CACTATATAC ATACCCCCCC CTCTCCTCCC ATCCCCCCAA CCCTACCACC ACCACCACCA CCACCTCCTC
4971   CCCCCTCGCT GCCGGACGAC GAGCTCCTCC CCCCTCCCCC TCCGCCGCCG CCGGTAACCA CCCCGCCCCT
5041   CTCCTCTTTC TTTCTCCGTT TTTTTTTTCG TCTCGGTCTC GATCTTTGGC CTTGGTAGTT TGGGTGGGCG
5111   AGAGCGGCTT CGTCGCCCAG ATCGGTGCGC GGGAGGGGCG GGATCTCGCG GCTGGCGTCT CCGGGCGTGA
              BamHI                                 BglII
              ~~~~~~~                               ~~~~~~~
5181   GTCGGCCCGG ATCCTCGCGG GGAATGGGGC TCTCGGATGT AGATCTTCTT TCTTTCTTCT TTTTGTGGTA
5251   GAATTTGAAT CCCTCAGCAT TGTTCATCGG TAGTTTTTCT TTTCATGATT TGTGACAAAT GCAGCCTCGT
5321   GCGGAGCTTT TTTGTAGC
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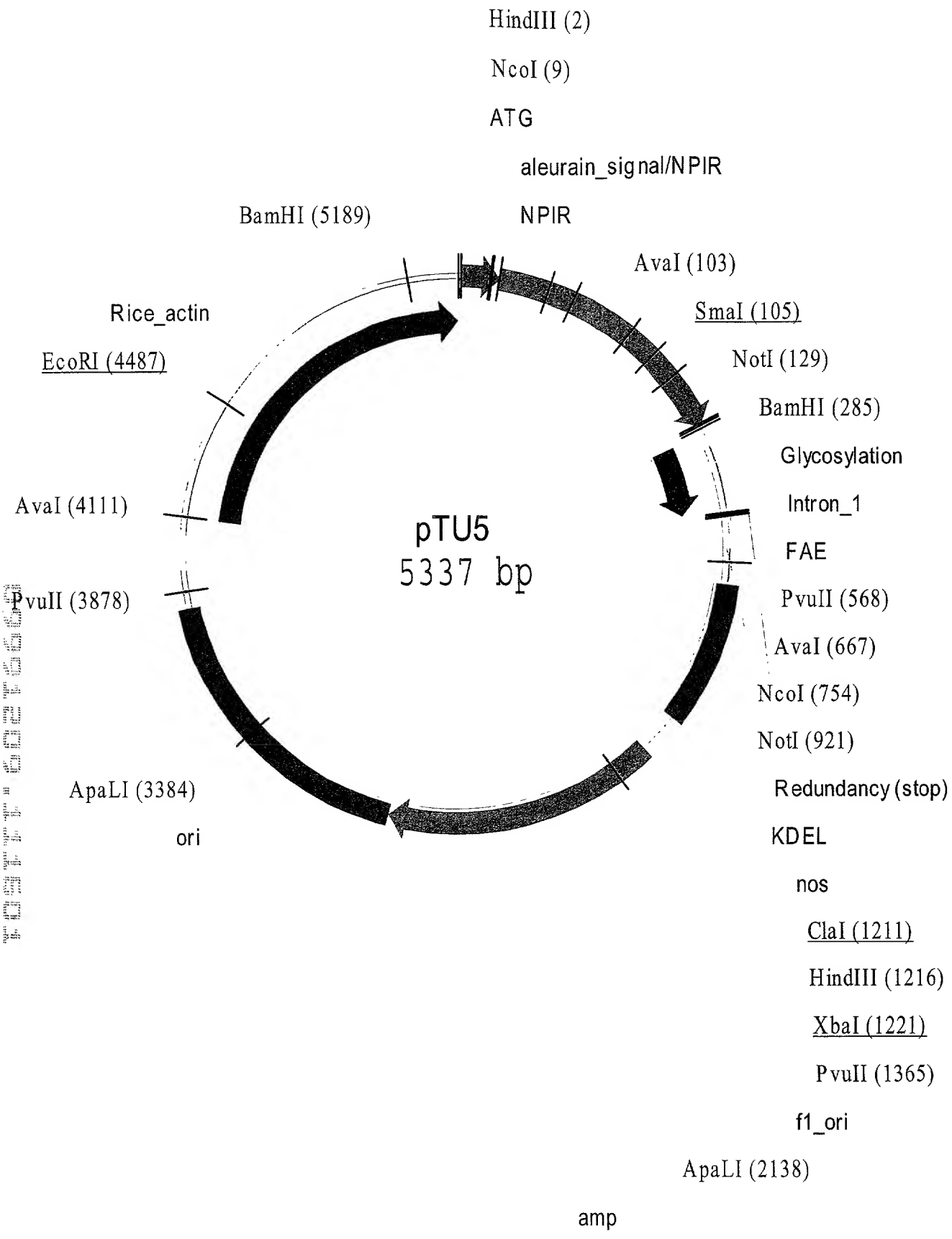

HindIII (2)
NcoI (9)
ATG
aleurain_signal/NPIR
NPIR
AvaI (103)
SmaI (105)
NotI (129)
BamHI (285)
Glycosylation
Intron_1
FAE
PvuII (568)
AvaI (667)
NcoI (754)
NotI (921)
Redundancy (stop)
KDEL
nos
ClaI (1211)
HindIII (1216)
XbaI (1221)
PvuII (1365)
f1_ori
ApaLI (2138)
amp
ApaLI (3384)
ori
PvuII (3878)
AvaI (4111)
EcoRI (4487)
Rice_actin
BamHI (5189)
pTU5
5337 bp

Figure 40 A

Sequence for pTU5

```
     HindIII NcoI
     ~~~~~~ ~~~~~~~
   1 AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT
     TTCGAATGGT ACCGGGTGCG GGCGCAGGAG GAGGACCGCG AGCGGCACGA

  51 GGCCACGGCC GCCGTCGCCG TCGCCTCCTC CTCCTCCTTC GCCGACTCCA
     CCGGTGCCGG CGGCAGCGGC AGCGGAGGAG GAGGAGGAAG CGGCTGAGGT

       SmaI
      ~~~~~~
       AvaI                          NotI
      ~~~~~~                        ~~~~~~~~~~
 101 ACCCGGGCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC GCAGGGCATC
     TGGGCCCGGC CGGGCAGTGG CTGGCGCGCC GGCGGAGGTG CGTCCCGTAG

 151 TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC
     AGGCTTCTGG AGATGTCGGC AAATCAGCTT TACCGGTGAT AGAGGGTTCG

 201 TGCCTACGCC GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA
     ACGGATGCGG CTGGACACGT TGTAAGGCAG CTGATAATAG TTCCCTCTCT

                                              BamHI
                                             ~~~~~~
 251 AAATTTACAA TTCTCAAACT GACATTAACG GATGGATCCT CCGCGACGAC
     TTTAAATGTT AAGAGTTTGA CTGTAATTGC CTACCTAGGA GGCGCTGCTG

 301 AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA
     TCGTCGTTTC TTTATTAGTG GCAGAAGGCA CCGTGACCAT CACTATGCTT

 351 TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC
     AGATGTTGAG CTATGATTGA TGTGGGAGTG CGGAAAGCTG TGGGATGGTG

 401 AATGCAACGG TTGTGAAGTA CACGGTGGAT ATTATATTGG ATGGGTCTCC
     TTACGTTGCC AACACTTCAT GTGCCACCTA TAATATAACC TACCCAGAGG

 451 GTCCAGGACC AAGTCGAGTC GCTTGTCAAA CAGCAGGTTA GCCAGTATCC
     CAGGTCCTGG TTCAGCTCAG CGAACAGTTT GTCGTCCAAT CGGTCATAGG

 501 GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC TCCCTGGCGG
     CCTGATGCGC GACTGGCACT GGCCGGTGMG GGAGCCGCGG AGGGACCGCC

                   PvuII
                  ~~~~~~
 551 CACTCACTGC CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC
     GTGAGTGACG GCGGGTCGAC AGACGCTGTA TGCTGTTGTA GGCGGACATG

 601 ACCTTCGGCG AACCGCGCAG CGGCAATCAG GCCTTCGCGT CGTACATGAA
     TGGAAGCCGC TTGGCGCGTC GCCGTTAGTC CGGAAGCGCA GCATGTACTT

                    AvaI
```

Fig. 40 B

```
                          ~~~~~~~
651   CGATGCCTTC CAAGCCTCGA GCCCAGATAC GACGCAGTAT TTCCGGGTCA
      GCTACGGAAG GTTCGGAGCT CGGGTCTATG CTGCGTCATA AAGGCCCAGT

701   CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC
      GAGTACGGTT GCTGCCGTAG GGTTTGGACG GGGGCCACCT CGTCCCCATG

         NcoI
        ~~~~~~
751   GCCCATGGCG GTGTAGAGTA CTGGAGCGTT GATCCTTACA GCGCCCAGAA
      CGGGTACCGC CACATCTCAT GACCTCGCAA CTAGGAATGT CGCGGGTCTT

801   CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG GCCCAGGGCG
      GTGTAAACAG ACGTGACCCC TACTTCACGT CACGACACTC CGGGTCCCGC

851   GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT GACGAGCGGC
      CTGTCCCACA CTTATTACGC GTGTGCTGAA TAAAACCCTA CTGCTCGCCG

                             NotI
                           ~~~~~~~~~
901   GCATGCACCT GGCCGGTCGC GGCCGCGGAA CCACTGAAGG ATGAGCTGTA
      CGTACGTGGA CCGGCCAGCG CCGGCGCCTT GGTGACTTCC TACTCGACAT

951   AAGAAGCAGA TCGTTCAAAC ATTTGGCAAT AAAGTTTCTT AAGATTGAAT
      TTCTTCGTCT AGCAAGTTTG TAAACCGTTA TTTCAAAGAA TTCTAACTTA

1001  CCTGTTGCCG GTCTTGCGAT GATTATCATA TAATTTCTGT TGAATTACGT
      GGACAACGGC CAGAACGCTA CTAATAGTAT ATTAAAGACA ACTTAATGCA

1051  TAAGCATGTA ATAATTAACA TGTAATGCAT GACGTTATTT ATGAGATGGG
      ATTCGTACAT TATTAATTGT ACATTACGTA CTGCAATAAA TACTCTACCC

1101  TTTTTATGAT TAGAGTCCCG CAATTATACA TTTAATACGC GATAGAAAAC
      AAAAATACTA ATCTCAGGGC GTTAATATGT AAATTATGCG CTATCTTTTG

1151  AAAATATAGC GCGCAAACTA GGATAAATTA TCGCGCGCGG TGTCATCTAT
      TTTTATATCG CGCGTTTGAT CCTATTTAAT AGCGCGCGCC ACAGTAGATA

                             XbaI
                           ~~~~~~~
                  ClaI  HindIII
                 ~~~~~~~~~~~~~~
1201  GTTACTAGAT CGATAAGCTT CTAGAGCGGC CGGTGGAGCT CCAATTCGCC
      CAATGATCTA GCTATTCGAA GATCTCGCCG GCCACCTCGA GGTTAAGCGG

1251  CTATAGTGAG TCGTATTACG CGCGCTCACT GGCCGTCGTT TTACAACGTC
      GATATCACTC AGCATAATGC GCGCGAGTGA CCGGCAGCAA AATGTTGCAG

1301  GTGACTGGGA AAACCCTGGC GTTACCCAAC TTAATCGCCT TGCAGCACAT
      CACTGACCCT TTTGGGACCG CAATGGGTTG AATTAGCGGA ACGTCGTGTA

                      PvuII
                     ~~~~~~
1351  CCCCCTTTCG CCAGCTGGCG TAATAGCGAA GAGGCCCGCA CCGATCGCCC
```

Fig. 40 C

```
      GGGGGAAAGC GGTCGACCGC ATTATCGCTT CTCCGGGCGT GGCTAGCGGG

1401  TTCCCAACAG TTGCGCAGCC TGAATGGCGA ATGGGACGCG CCCTGTAGCG
      AAGGGTTGTC AACGCGTCGG ACTTACCGCT TACCCTGCGC GGGACATCGC

1451  GCGCATTAAG CGCGGCGGGT GTGGTGGTTA CGCGCAGCGT GACCGCTACA
      CGCGTAATTC GCGCCGCCCA CACCACCAAT GCGCGTCGCA CTGGCGATGT

1501  CTTGCCAGCG CCCTAGCGCC CGCTCCTTTC GCTTTCTTCC CTTCCTTTCT
      GAACGGTCGC GGGATCGCGG GCGAGGAAAG CGAAAGAAGG GAAGGAAAGA

1551  CGCCACGTTC GCCGGCTTTC CCCGTCAAGC TCTAAATCGG GGGCTCCCTT
      GCGGTGCAAG CGGCCGAAAG GGGCAGTTCG AGATTTAGCC CCCGAGGGAA

1601  TAGGGTTCCG ATTTAGTGCT TTACGGCACC TCGACCCCAA AAAACTTGAT
      ATCCCAAGGC TAAATCACGA AATGCCGTGG AGCTGGGGTT TTTTGAACTA

1651  TAGGGTGATG GTTCACGTAG TGGGCCATCG CCCTGATAGA CGGTTTTTCG
      ATCCCACTAC CAAGTGCATC ACCCGGTAGC GGGACTATCT GCCAAAAAGC

1701  CCCTTTGACG TTGGAGTCCA CGTTCTTTAA TAGTGGACTC TTGTTCCAAA
      GGGAAACTGC AACCTCAGGT GCAAGAAATT ATCACCTGAG AACAAGGTTT

1751  CTGGAACAAC ACTCAACCCT ATCTCGGTCT ATTCTTTTGA TTTATAAGGG
      GACCTTGTTG TGAGTTGGGA TAGAGCCAGA TAAGAAAACT AAATATTCCC

1801  ATTTTGCCGA TTTCGGCCTA TTGGTTAAAA AATGAGCTGA TTTAACAAAA
      TAAAACGGCT AAAGCCGGAT AACCAATTTT TTACTCGACT AAATTGTTTT

1851  ATTTAACGCG AATTTTAACA AAATATTAAC GCTTACAATT TAGGTGGCAC
      TAAATTGCGC TTAAAATTGT TTTATAATTG CGAATGTTAA ATCCACCGTG

1901  TTTTCGGGGA AATGTGCGCG GAACCCCTAT TTGTTTATTT TTCTAAATAC
      AAAAGCCCCT TTACACGCGC CTTGGGGATA AACAAATAAA AAGATTTATG

1951  ATTCAAATAT GTATCCGCTC ATGAGACAAT AACCCTGATA AATGCTTCAA
      TAAGTTTATA CATAGGCGAG TACTCTGTTA TTGGGACTAT TTACGAAGTT

2001  TAATATTGAA AAAGGAAGAG TATGAGTATT CAACATTTCC GTGTCGCCCT
      ATTATAACTT TTTCCTTCTC ATACTCATAA GTTGTAAAGG CACAGCGGGA

2051  TATTCCCTTT TTTGCGGCAT TTTGCCTTCC TGTTTTTGCT CACCCAGAAA
      ATAAGGGAAA AAACGCCGTA AAACGGAAGG ACAAAAACGA GTGGGTCTTT

                                                  ApaLI
                                                  ~~~~~~~
2101  CGCTGGTGAA AGTAAAAGAT GCTGAAGATC AGTTGGGTGC ACGAGTGGGT
      GCGACCACTT TCATTTTCTA CGACTTCTAG TCAACCCACG TGCTCACCCA

2151  TACATCGAAC TGGATCTCAA CAGCGGTAAG ATCCTTGAGA GTTTTCGCCC
      ATGTAGCTTG ACCTAGAGTT GTCGCCATTC TAGGAACTCT CAAAAGCGGG

2201  CGAAGAACGT TTTCCAATGA TGAGCACTTT TAAAGTTCTG CTATGTGGCG
      GCTTCTTGCA AAAGGTTACT ACTCGTGAAA ATTTCAAGAC GATACACCGC
```

Fig. 40D

```
2251  CGGTATTATC CCGTATTGAC GCCGGGCAAG AGCAACTCGG TCGCCGCATA
      GCCATAATAG GGCATAACTG CGGCCCGTTC TCGTTGAGCC AGCGGCGTAT

2301  CACTATTCTC AGAATGACTT GGTTGAGTAC TCACCAGTCA CAGAAAAGCA
      GTGATAAGAG TCTTACTGAA CCAACTCATG AGTGGTCAGT GTCTTTTCGT

2351  TCTTACGGAT GGCATGACAG TAAGAGAATT ATGCAGTGCT GCCATAACCA
      AGAATGCCTA CCGTACTGTC ATTCTCTTAA TACGTCACGA CGGTATTGGT

2401  TGAGTGATAA CACTGCGGCC AACTTACTTC TGACAACGAT CGGAGGACCG
      ACTCACTATT GTGACGCCGG TTGAATGAAG ACTGTTGCTA GCCTCCTGGC

2451  AAGGAGCTAA CCGCTTTTTT GCACAACATG GGGGATCATG TAACTCGCCT
      TTCCTCGATT GGCGAAAAAA CGTGTTGTAC CCCCTAGTAC ATTGAGCGGA

2501  TGATCGTTGG GAACCGGAGC TGAATGAAGC CATACCAAAC GACGAGCGTG
      ACTAGCAACC CTTGGCCTCG ACTTACTTCG GTATGGTTTG CTGCTCGCAC

2551  ACACCACGAT GCCTGTAGCA ATGGCAACAA CGTTGCGCAA ACTATTAACT
      TGTGGTGCTA CGGACATCGT TACCGTTGTT GCAACGCGTT TGATAATTGA

2601  GGCGAACTAC TTACTCTAGC TTCCCGGCAA CAATTAATAG ACTGGATGGA
      CCGCTTGATG AATGAGATCG AAGGGCCGTT GTTAATTATC TGACCTACCT

2651  GGCGGATAAA GTTGCAGGAC CACTTCTGCG CTCGGCCCTT CCGGCTGGCT
      CCGCCTATTT CAACGTCCTG GTGAAGACGC GAGCCGGGAA GGCCGACCGA

2701  GGTTTATTGC TGATAAATCT GGAGCCGGTG AGCGTGGGTC TCGCGGTATC
      CCAAATAACG ACTATTTAGA CCTCGGCCAC TCGCACCCAG AGCGCCATAG

2751  ATTGCAGCAC TGGGGCCAGA TGGTAAGCCC TCCCGTATCG TAGTTATCTA
      TAACGTCGTG ACCCCGGTCT ACCATTCGGG AGGGCATAGC ATCAATAGAT

2801  CACGACGGGG AGTCAGGCAA CTATGGATGA ACGAAATAGA CAGATCGCTG
      GTGCTGCCCC TCAGTCCGTT GATACCTACT TGCTTTATCT GTCTAGCGAC

2851  AGATAGGTGC CTCACTGATT AAGCATTGGT AACTGTCAGA CCAAGTTTAC
      TCTATCCACG GAGTGACTAA TTCGTAACCA TTGACAGTCT GGTTCAAATG

2901  TCATATATAC TTTAGATTGA TTTAAAACTT CATTTTTAAT TTAAAAGGAT
      AGTATATATG AAATCTAACT AAATTTTGAA GTAAAAATTA AATTTTCCTA

2951  CTAGGTGAAG ATCCTTTTTG ATAATCTCAT GACCAAAATC CCTTAACGTG
      GATCCACTTC TAGGAAAAAC TATTAGAGTA CTGGTTTTAG GGAATTGCAC

3001  AGTTTTCGTT CCACTGAGCG TCAGACCCCG TAGAAAAGAT CAAAGGATCT
      TCAAAAGCAA GGTGACTCGC AGTCTGGGGC ATCTTTTCTA GTTTCCTAGA

3051  TCTTGAGATC CTTTTTTTCT GCGCGTAATC TGCTGCTTGC AAACAAAAAA
      AGAACTCTAG GAAAAAAAGA CGCGCATTAG ACGACGAACG TTTGTTTTTT

3101  ACCACCGCTA CCAGCGGTGG TTTGTTTGCC GGATCAAGAG CTACCAACTC
      TGGTGGCGAT GGTCGCCACC AAACAAACGG CCTAGTTCTC GATGGTTGAG
```

Fig. 40E

```
3151  TTTTTCCGAA GGTAACTGGC TTCAGCAGAG CGCAGATACC AAATACTGTC
      AAAAAGGCTT CCATTGACCG AAGTCGTCTC GCGTCTATGG TTTATGACAG

3201  CTTCTAGTGT AGCCGTAGTT AGGCCACCAC TTCAAGAACT CTGTAGCACC
      GAAGATCACA TCGGCATCAA TCCGGTGGTG AAGTTCTTGA GACATCGTGG

3251  GCCTACATAC CTCGCTCTGC TAATCCTGTT ACCAGTGGCT GCTGCCAGTG
      CGGATGTATG GAGCGAGACG ATTAGGACAA TGGTCACCGA CGACGGTCAC

3301  GCGATAAGTC GTGTCTTACC GGGTTGGACT CAAGACGATA GTTACCGGAT
      CGCTATTCAG CACAGAATGG CCCAACCTGA GTTCTGCTAT CAATGGCCTA

                                          ApaLI
                                          ~~~~~~
3351  AAGGCGCAGC GGTCGGGCTG AACGGGGGGT TCGTGCACAC AGCCCAGCTT
      TTCCGCGTCG CCAGCCCGAC TTGCCCCCCA AGCACGTGTG TCGGGTCGAA

3401  GGAGCGAACG ACCTACACCG AACTGAGATA CCTACAGCGT GAGCTATGAG
      CCTCGCTTGC TGGATGTGGC TTGACTCTAT GGATGTCGCA CTCGATACTC

3451  AAAGCGCCAC GCTTCCCGAA GGGAGAAAGG CGGACAGGTA TCCGGTAAGC
      TTTCGCGGTG CGAAGGGCTT CCCTCTTTCC GCCTGTCCAT AGGCCATTCG

3501  GGCAGGGTCG GAACAGGAGA GCGCACGAGG GAGCTTCCAG GGGGAAACGC
      CCGTCCCAGC CTTGTCCTCT CGCGTGCTCC CTCGAAGGTC CCCCTTTGCG

3551  CTGGTATCTT TATAGTCCTG TCGGGTTTCG CCACCTCTGA CTTGAGCGTC
      GACCATAGAA ATATCAGGAC AGCCCAAAGC GGTGGAGACT GAACTCGCAG

3601  GATTTTTGTG ATGCTCGTCA GGGGGGCGGA GCCTATGGAA AAACGCCAGC
      CTAAAAACAC TACGAGCAGT CCCCCCGCCT CGGATACCTT TTTGCGGTCG

3651  AACGCGGCCT TTTTACGGTT CCTGGCCTTT TGCTGGCCTT TTGCTCACAT
      TTGCGCCGGA AAAATGCCAA GGACCGGAAA ACGACCGGAA AACGAGTGTA

3701  GTTCTTTCCT GCGTTATCCC CTGATTCTGT GGATAACCGT ATTACCGCCT
      CAAGAAAGGA CGCAATAGGG GACTAAGACA CCTATTGGCA TAATGGCGGA

3751  TTGAGTGAGC TGATACCGCT CGCCGCAGCC GAACGACCGA GCGCAGCGAG
      AACTCACTCG ACTATGGCGA GCGGCGTCGG CTTGCTGGCT CGCGTCGCTC

3801  TCAGTGAGCG AGGAAGCGGA AGAGCGCCCA ATACGCAAAC CGCCTCTCCC
      AGTCACTCGC TCCTTCGCCT TCTCGCGGGT TATGCGTTTG GCGGAGAGGG

                                    PvuII
                                    ~~~~~~
3851  CGCGCGTTGG CCGATTCATT AATGCAGCTG GCACGACAGG TTTCCCGACT
      GCGCGCAACC GGCTAAGTAA TTACGTCGAC CGTGCTGTCC AAAGGGCTGA

3901  GGAAAGCGGG CAGTGAGCGC AACGCAATTA ATGTGAGTTA GCTCACTCAT
      CCTTTCGCCC GTCACTCGCG TTGCGTTAAT TACACTCAAT CGAGTGAGTA

3951  TAGGCACCCC AGGCTTTACA CTTTATGCTT CCGGCTCGTA TGTTGTGTGG
```

Fig. 40 F

```
      ATCCGTGGGG TCCGAAATGT GAAATACGAA GGCCGAGCAT ACAACACACC

4001  AATTGTGAGC GGATAACAAT TTCACACAGG AAACAGCTAT GACCATGATT
      TTAACACTCG CCTATTGTTA AAGTGTGTCC TTTGTCGATA CTGGTACTAA

4051  ACGCCAAGCG CGCAATTAAC CCTCACTAAA GGGAACAAAA GCTGGGTACC
      TGCGGTTCGC GCGTTAATTG GGAGTGATTT CCCTTGTTTT CGACCCATGG

                 AvaI
               ~~~~~~~
4101  GGGCCCCCCC TCGAGGTCAT TCATATGCTT GAGAAGAGAG TCGGGATAGT
      CCCGGGGGGG AGCTCCAGTA AGTATACGAA CTCTTCTCTC AGCCCTATCA

4151  CCAAAATAAA ACAAAGGTAA GATTACCTGG TCAAAAGTGA AAACATCAGT
      GGTTTTATTT TGTTTCCATT CTAATGGACC AGTTTTCACT TTTGTAGTCA

4201  TAAAAGGTGG TATAAGTAAA ATATCGGTAA TAAAAGGTGG CCCAAAGTGA
      ATTTTCCACC ATATTCATTT TATAGCCATT ATTTTCCACC GGGTTTCACT

4251  AATTTACTCT TTTCTACTAT TATAAAAATT GAGGATGTTT TGTCGGTACT
      TTAAATGAGA AAAGATGATA ATATTTTTAA CTCCTACAAA ACAGCCATGA

4301  TTGATACGTC ATTTTTGTAT GAATTGGTTT TTAAGTTTAT TCGCGATTTG
      AACTATGCAG TAAAAACATA CTTAACCAAA AATTCAAATA AGCGCTAAAC

4351  GAAATGCATA TCTGTATTTG AGTCGGTTTT TAAGTTCGTT GCTTTTGTAA
      CTTTACGTAT AGACATAAAC TCAGCCAAAA ATTCAAGCAA CGAAAACATT

4401  ATACAGAGGG ATTTGTATAA GAAATATCTT TAAAAAACCC ATATGCTAAT
      TATGTCTCCC TAAACATATT CTTTATAGAA ATTTTTTGGG TATACGATTA

                                                 EcoRI
                                               ~~~~~~~
4451  TTGACATAAT TTTTGAGAAA AATATATATT CAGGCGAATT CCACAATGAA
      AACTGTATTA AAAACTCTTT TTATATATAA GTCCGCTTAA GGTGTTACTT

4501  CAATAATAAG ATTAAAATAG CTTGCCCCCG TTGCAGCGAT GGGTATTTTT
      GTTATTATTC TAATTTTATC GAACGGGGGC AACGTCGCTA CCCATAAAAA

4551  TCTAGTAAAA TAAAAGATAA ACTTAGACTC AAAACATTTA CAAAAACAAC
      AGATCATTTT ATTTTCTATT TGAATCTGAG TTTTGTAAAT GTTTTTGTTG

4601  CCCTAAAGTC CTAAAGCCCA AAGTGCTATG CACGATCCAT AGCAAGCCCA
      GGGATTTCAG GATTTCGGGT TTCACGATAC GTGCTAGGTA TCGTTCGGGT

4651  GCCCAACCCA ACCCAACCCA ACCCACCCCA GTGCAGCCAA CTGGCAAATA
      CGGGTTGGGT TGGGTTGGGT TGGGTGGGGT CACGTCGGTT GACCGTTTAT

4701  GTCTCCACCC CCGGCACTAT CACCGTGAGT TGTCCGCACC ACCGCACGTC
      CAGAGGTGGG GGCCGTGATA GTGGCACTCA ACAGGCGTGG TGGCGTGCAG

4751  TCGCAGCCAA AAAAAAAAAA AGAAAGAAAA AAAAGAAAAA GAAAAACAGC
      AGCGTCGGTT TTTTTTTTTT TCTTTCTTTT TTTTCTTTTT CTTTTTGTCG
```

Fig. 40 G

```
4801  AGGTGGGTCC GGGTCGTGGG GGCCGGAAAA GCGAGGAGGA TCGCGAGCAG
      TCCACCCAGG CCCAGCACCC CCGGCCTTTT CGCTCCTCCT AGCGCTCGTC

4851  CGACGAGGCC CGGCCCTCCC TCCGCTTCCA AAGAAACGCC CCCCATCGCC
      GCTGCTCCGG GCCGGGAGGG AGGCGAAGGT TTCTTTGCGG GGGGTAGCGG

4901  ACTATATACA TACCCCCCCC TCTCCTCCCA TCCCCCCAAC CCTACCACCA
      TGATATATGT ATGGGGGGGG AGAGGAGGGT AGGGGGGTTG GGATGGTGGT

4951  CCACCACCAC CACCTCCTCC CCCCTCGCTG CCGGACGACG AGCTCCTCCC
      GGTGGTGGTG GTGGAGGAGG GGGGAGCGAC GGCCTGCTGC TCGAGGAGGG

5001  CCCTCCCCCT CCGCCGCCGC CGGTAACCAC CCCGCCCCTC TCCTCTTTCT
      GGGAGGGGGA GGCGGCGGCG GCCATTGGTG GGGCGGGGAG AGGAGAAAGA

5051  TTCTCCGTTT TTTTTTTCGT CTCGGTCTCG ATCTTTGGCC TTGGTAGTTT
      AAGAGGCAAA AAAAAAAGCA GAGCCAGAGC TAGAAACCGG AACCATCAAA

5101  GGGTGGGCGA GAGCGGCTTC GTCGCCCAGA TCGGTGCGCG GGAGGGGCGG
      CCCACCCGCT CTCGCCGAAG CAGCGGGTCT AGCCACGCGC CCTCCCCGCC

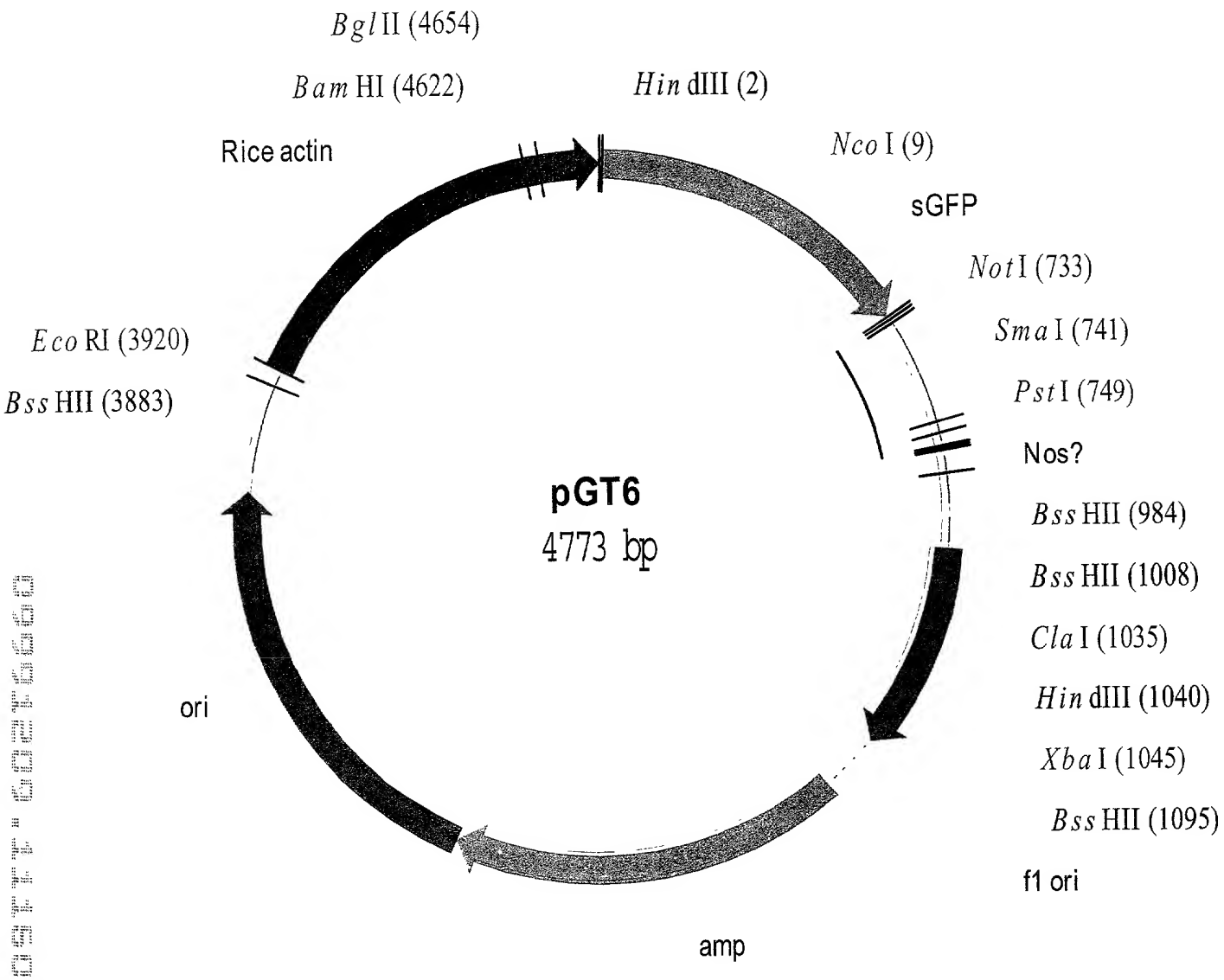
                                                    BamHI
                                                    ~~~~~~~
5151  GATCTCGCGG CTGGCGTCTC CGGGCGTGAG TCGGCCCGGA TCCTCGCGGG
      CTAGAGCGCC GACCGCAGAG GCCCGCACTC AGCCGGGCCT AGGAGCGCCC

5201  GAATGGGGCT CTCGGATGTA GATCTTCTTT CTTTCTTCTT TTTGTGGTAG
      CTTACCCCGA GAGCCTACAT CTAGAAGAAA GAAAGAAGAA AAACACCATC

5251  AATTTGAATC CCTCAGCATT GTTCATCGGT AGTTTTTCTT TTCATGATTT
      TTAAACTTAG GGAGTCGTAA CAAGTAGCCA TCAAAAAGAA AAGTACTAAA

5301  GTGACAAATG CAGCCTCGTG CGGAGCTTTT TTGTAGC
      CACTGTTTAC GTCGGAGCAC GCCTCGAAAA AACATCG
```


Fig. 40H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Hin dIII (2)
Rice actin
Nco I (9)
sGFP
Not I (733)
Sma I (741)
Pst I (749)
Nos?
Eco RI (3920)
Bss HII (3883)
pGT6
4773 bp
Bss HII (984)
Bss HII (1008)
Cla I (1035)
Hin dIII (1040)
Xba I (1045)
Bss HII (1095)
f1 ori
ori
amp

Fig. 41A

Sequence for pGT6

```
          HindIII NcoI
          ~~~~~~ ~~~~~~~
       1  AAGCTTACCA TGGTGAGCAA GGGCGAGGAG CTGTTCACCG GGGTGGTGCC
CATCCTGGTC GAGCTGGACG
          TTCGAATGGT ACCACTCGTT CCCGCTCCTC GACAAGTGGC CCCACCACGG
GTAGGACCAG CTCGACCTGC

      71  GCGACGTGAA CGGCCACAAG TTCAGCGTGT CCGGCGAGGG CGAGGGCGAT
GCCACCTACG GCAAGCTGAC
          CGCTGCACTT GCCGGTGTTC AAGTCGCACA GGCCGCTCCC GCTCCCGCTA
CGGTGGATGC CGTTCGACTG

     141  CCTGAAGTTC ATCTGCACCA CCGGCAAGCT GCCCGTGCCC TGGCCCACCC
TCGTGACCAC CTTCACCTAC
          GGACTTCAAG TAGACGTGGT GGCCGTTCGA CGGGCACGGG ACCGGGTGGG
AGCACTGGTG GAAGTGGATG

     211  GGCGTGCAGT GCTTCAGCCG CTACCCCGAC CACATGAAGC AGCACGACTT
CTTCAAGTCC GCCATGCCCG
          CCGCACGTCA CGAAGTCGGC GATGGGGCTG GTGTACTTCG TCGTGCTGAA
GAAGTTCAGG CGGTACGGGC

     281  AAGGCTACGT CCAGGAGCGC ACCATCTTCT TCAAGGACGA CGGCAACTAC
AAGACCCGCG CCGAGGTGAA
          TTCCGATGCA GGTCCTCGCG TGGTAGAAGA AGTTCCTGCT GCCGTTGATG
TTCTGGGCGC GGCTCCACTT

     351  GTTCGAGGGC GACACCCTGG TGAACCGCAT CGAGCTGAAG GGCATCGACT
TCAAGGAGGA CGGCAACATC
          CAAGCTCCCG CTGTGGGACC ACTTGGCGTA GCTCGACTTC CCGTAGCTGA
AGTTCCTCCT GCCGTTGTAG

     421  CTGGGGCACA AGCTGGAGTA CAACTACAAC AGCCACAACG TCTATATCAT
GGCCGACAAG CAGAAGAACG
          GACCCCGTGT TCGACCTCAT GTTGATGTTG TCGGTGTTGC AGATATAGTA
CCGGCTGTTC GTCTTCTTGC

     491  GCATCAAGGT GAACTTCAAG ATCCGCCACA ACATCGAGGA CGGCAGCGTG
CAGCTCGCCG ACCACTACCA
          CGTAGTTCCA CTTGAAGTTC TAGGCGGTGT TGTAGCTCCT GCCGTCGCAC
GTCGAGCGGC TGGTGATGGT

     561  GCAGAACACC CCCATCGGCG ACGGCCCCGT GCTGCTGCCC GACAACCACT
ACCTGAGCAC CCAGTCCGCC
          CGTCTTGTGG GGGTAGCCGC TGCCGGGGCA CGACGACGGG CTGTTGGTGA
TGGACTCGTG GGTCAGGCGG

     631  CTGAGCAAAG ACCCCAACGA GAAGCGCGAT CACATGGTCC TGCTGGAGTT
CGTGACCGCC GCCGGGATCA
          GACTCGTTTC TGGGGTTGCT CTTCGCGCTA GTGTACCAGG ACGACCTCAA
GCACTGGCGG CGGCCCTAGT
```

Fig. 41B

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                                                        SmaI
                                                        ~~~~~~~
                                                  NotI          PstI
                                                  ~~~~~~~~      ~~~~~~
     701  CTCACGGCAT GGACGAGCTG TACAAGTAAA GCGGCCGCCC GGGCTGCAGG
GAAACCACTG AAGGATGAGC
          GAGTGCCGTA CCTGCTCGAC ATGTTCATTT CGCCGGCGGG CCCGACGTCC
CTTTGGTGAC TTCCTACTCG

     771  TGTAAAGAAG CAGATCGTTC AAACATTTGG CAATAAAGTT TCTTAAGATT
GAATCCTGTT GCCGGTCTTG
          ACATTTCTTC GTCTAGCAAG TTTGTAAACC GTTATTTCAA AGAATTCTAA
CTTAGGACAA CGGCCAGAAC

     841  CGATGATTAT CATATAATTT CTGTTGAATT ACGTTAAGCA TGTAATAATT
AACATGTAAT GCATGACGTT
          GCTACTAATA GTATATTAAA GACAACTTAA TGCAATTCGT ACATTATTAA
TTGTACATTA CGTACTGCAA

     911  ATTTATGAGA TGGGTTTTTA TGATTAGAGT CCCGCAATTA TACATTTAAT
ACGCGATAGA AAACAAAATA
          TAAATACTCT ACCCAAAAAT ACTAATCTCA GGGCGTTAAT ATGTAAATTA
TGCGCTATCT TTTGTTTTAT


XbaI          .

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             BssHII                          BssHII
ClaI HindIII
             ~~~~~~                          ~~~~~~~
~~~~~~~~~~~~~~
     981  TAGCGCGCAA ACTAGGATAA ATTATCGCGC GCGGTGTCAT CTATGTTACT
AGATCGATAA GCTTCTAGAG
          ATCGCGCGTT TGATCCTATT TAATAGCGCG CGCCACAGTA GATACAATGA
TCTAGCTATT CGAAGATCTC

                                                              BssHII
                                                              ~~~~~~
    1051  CGGCCGGTGG AGCTCCAATT CGCCCTATAG TGAGTCGTAT TACGCGCGCT
CACTGGCCGT CGTTTTACAA
          GCCGGCCACC TCGAGGTTAA GCGGGATATC ACTCAGCATA ATGCGCGCGA
GTGACCGGCA GCAAAATGTT

    1121  CGTCGTGACT GGGAAAACCC TGGCGTTACC CAACTTAATC GCCTTGCAGC
ACATCCCCCT TTCGCCAGCT
          GCAGCACTGA CCCTTTTGGG ACCGCAATGG GTTGAATTAG CGGAACGTCG
TGTAGGGGGA AAGCGGTCGA

    1191  GGCGTAATAG CGAAGAGGCC CGCACCGATC GCCCTTCCCA ACAGTTGCGC
AGCCTGAATG GCGAATGGGA
          CCGCATTATC GCTTCTCCGG GCGTGGCTAG CGGGAAGGGT TGTCAACGCG
TCGGACTTAC CGCTTACCCT
```

Fig. 41C

1261 CGCGCCCTGT AGCGGCGCAT TAAGCGCGGC GGGTGTGGTG GTTACGCGCA
GCGTGACCGC TACACTTGCC
GCGCGGGACA TCGCCGCGTA ATTCGCGCCG CCCACACCAC CAATGCGCGT
CGCACTGGCG ATGTGAACGG

1331 AGCGCCCTAG CGCCCGCTCC TTTCGCTTTC TTCCCTTCCT TTCTCGCCAC
GTTCGCCGGC TTTCCCCGTC
TCGCGGGATC GCGGGCGAGG AAAGCGAAAG AAGGGAAGGA AAGAGCGGTG
CAAGCGGCCG AAAGGGGCAG

1401 AAGCTCTAAA TCGGGGGCTC CCTTTAGGGT TCCGATTTAG TGCTTTACGG
CACCTCGACC CCAAAAAACT
TTCGAGATTT AGCCCCCGAG GGAAATCCCA AGGCTAAATC ACGAAATGCC
GTGGAGCTGG GGTTTTTTGA

1471 TGATTAGGGT GATGGTTCAC GTAGTGGGCC ATCGCCCTGA TAGACGGTTT
TTCGCCCTTT GACGTTGGAG
ACTAATCCCA CTACCAAGTG CATCACCCGG TAGCGGGACT ATCTGCCAAA
AAGCGGGAAA CTGCAACCTC

1541 TCCACGTTCT TTAATAGTGG ACTCTTGTTC CAAACTGGAA CAACACTCAA
CCCTATCTCG GTCTATTCTT
AGGTGCAAGA AATTATCACC TGAGAACAAG GTTTGACCTT GTTGTGAGTT
GGGATAGAGC CAGATAAGAA

1611 TTGATTTATA AGGGATTTTG CCGATTTCGG CCTATTGGTT AAAAAATGAG
CTGATTTAAC AAAAATTTAA
AACTAAATAT TCCCTAAAAC GGCTAAAGCC GGATAACCAA TTTTTTACTC
GACTAAATTG TTTTTAAATT

1681 CGCGAATTTT AACAAAATAT TAACGCTTAC AATTTAGGTG GCACTTTTCG
GGGAAATGTG CGCGGAACCC
GCGCTTAAAA TTGTTTTATA ATTGCGAATG TTAAATCCAC CGTGAAAAGC
CCCTTTACAC GCGCCTTGGG

1751 CTATTTGTTT ATTTTTCTAA ATACATTCAA ATATGTATCC GCTCATGAGA
CAATAACCCT GATAAATGCT
GATAAACAAA TAAAAAGATT TATGTAAGTT TATACATAGG CGAGTACTCT
GTTATTGGGA CTATTTACGA

1821 TCAATAATAT TGAAAAAGGA AGAGTATGAG TATTCAACAT TTCCGTGTCG
CCCTTATTCC CTTTTTTGCG
AGTTATTATA ACTTTTTCCT TCTCATACTC ATAAGTTGTA AAGGCACAGC
GGGAATAAGG GAAAAAACGC

1891 GCATTTTGCC TTCCTGTTTT TGCTCACCCA GAAACGCTGG TGAAAGTAAA
AGATGCTGAA GATCAGTTGG
CGTAAAACGG AAGGACAAAA ACGAGTGGGT CTTTGCGACC ACTTTCATTT
TCTACGACTT CTAGTCAACC

1961 GTGCACGAGT GGGTTACATC GAACTGGATC TCAACAGCGG TAAGATCCTT
GAGAGTTTTC GCCCCGAAGA

Fig. 41 D

CACGTGCTCA CCCAATGTAG CTTGACCTAG AGTTGTCGCC ATTCTAGGAA CTCTCAAAAG CGGGGCTTCT

2031 ACGTTTTCCA ATGATGAGCA CTTTTAAAGT TCTGCTATGT GGCGCGGTAT TATCCCGTAT TGACGCCGGG
TGCAAAAGGT TACTACTCGT GAAAATTTCA AGACGATACA CCGCGCCATA ATAGGGCATA ACTGCGGCCC

2101 CAAGAGCAAC TCGGTCGCCG CATACACTAT TCTCAGAATG ACTTGGTTGA GTACTCACCA GTCACAGAAA
GTTCTCGTTG AGCCAGCGGC GTATGTGATA AGAGTCTTAC TGAACCAACT CATGAGTGGT CAGTGTCTTT

2171 AGCATCTTAC GGATGGCATG ACAGTAAGAG AATTATGCAG TGCTGCCATA ACCATGAGTG ATAACACTGC
TCGTAGAATG CCTACCGTAC TGTCATTCTC TTAATACGTC ACGACGGTAT TGGTACTCAC TATTGTGACG

2241 GGCCAACTTA CTTCTGACAA CGATCGGAGG ACCGAAGGAG CTAACCGCTT TTTTGCACAA CATGGGGGAT
CCGGTTGAAT GAAGACTGTT GCTAGCCTCC TGGCTTCCTC GATTGGCGAA AAAACGTGTT GTACCCCCTA

2311 CATGTAACTC GCCTTGATCG TTGGGAACCG GAGCTGAATG AAGCCATACC AAACGACGAG CGTGACACCA
GTACATTGAG CGGAACTAGC AACCCTTGGC CTCGACTTAC TTCGGTATGG TTTGCTGCTC GCACTGTGGT

2381 CGATGCCTGT AGCAATGGCA ACAACGTTGC GCAAACTATT AACTGGCGAA CTACTTACTC TAGCTTCCCG
GCTACGGACA TCGTTACCGT TGTTGCAACG CGTTTGATAA TTGACCGCTT GATGAATGAG ATCGAAGGGC

2451 GCAACAATTA ATAGACTGGA TGGAGGCGGA TAAAGTTGCA GGACCACTTC TGCGCTCGGC CCTTCCGGCT
CGTTGTTAAT TATCTGACCT ACCTCCGCCT ATTTCAACGT CCTGGTGAAG ACGCGAGCCG GGAAGGCCGA

2521 GGCTGGTTTA TTGCTGATAA ATCTGGAGCC GGTGAGCGTG GGTCTCGCGG TATCATTGCA GCACTGGGGC
CCGACCAAAT AACGACTATT TAGACCTCGG CCACTCGCAC CCAGAGCGCC ATAGTAACGT CGTGACCCCG

2591 CAGATGGTAA GCCCTCCCGT ATCGTAGTTA TCTACACGAC GGGGAGTCAG GCAACTATGG ATGAACGAAA
GTCTACCATT CGGGAGGGCA TAGCATCAAT AGATGTGCTG CCCCTCAGTC CGTTGATACC TACTTGCTTT

2661 TAGACAGATC GCTGAGATAG GTGCCTCACT GATTAAGCAT TGGTAACTGT CAGACCAAGT TTACTCATAT
ATCTGTCTAG CGACTCTATC CACGGAGTGA CTAATTCGTA ACCATTGACA GTCTGGTTCA AATGAGTATA

Fig. 41 E

2731 ATACTTTAGA TTGATTTAAA ACTTCATTTT TAATTTAAAA GGATCTAGGT
GAAGATCCTT TTTGATAATC
TATGAAATCT AACTAAATTT TGAAGTAAAA ATTAAATTTT CCTAGATCCA
CTTCTAGGAA AAACTATTAG

2801 TCATGACCAA AATCCCTTAA CGTGAGTTTT CGTTCCACTG AGCGTCAGAC
CCCGTAGAAA AGATCAAAGG
AGTACTGGTT TTAGGGAATT GCACTCAAAA GCAAGGTGAC TCGCAGTCTG
GGGCATCTTT TCTAGTTTCC

2871 ATCTTCTTGA GATCCTTTTT TTCTGCGCGT AATCTGCTGC TTGCAAACAA
AAAAACCACC GCTACCAGCG
TAGAAGAACT CTAGGAAAAA AAGACGCGCA TTAGACGACG AACGTTTGTT
TTTTTGGTGG CGATGGTCGC

2941 GTGGTTTGTT TGCCGGATCA AGAGCTACCA ACTCTTTTTC CGAAGGTAAC
TGGCTTCAGC AGAGCGCAGA
CACCAAACAA ACGGCCTAGT TCTCGATGGT TGAGAAAAAG GCTTCCATTG
ACCGAAGTCG TCTCGCGTCT

3011 TACCAAATAC TGTCCTTCTA GTGTAGCCGT AGTTAGGCCA CCACTTCAAG
AACTCTGTAG CACCGCCTAC
ATGGTTTATG ACAGGAAGAT CACATCGGCA TCAATCCGGT GGTGAAGTTC
TTGAGACATC GTGGCGGATG

3081 ATACCTCGCT CTGCTAATCC TGTTACCAGT GGCTGCTGCC AGTGGCGATA
AGTCGTGTCT TACCGGGTTG
TATGGAGCGA GACGATTAGG ACAATGGTCA CCGACGACGG TCACCGCTAT
TCAGCACAGA ATGGCCCAAC

3151 GACTCAAGAC GATAGTTACC GGATAAGGCG CAGCGGTCGG GCTGAACGGG
GGGTTCGTGC ACACAGCCCA
CTGAGTTCTG CTATCAATGG CCTATTCCGC GTCGCCAGCC CGACTTGCCC
CCCAAGCACG TGTGTCGGGT

3221 GCTTGGAGCG AACGACCTAC ACCGAACTGA GATACCTACA GCGTGAGCTA
TGAGAAAGCG CCACGCTTCC
CGAACCTCGC TTGCTGGATG TGGCTTGACT CTATGGATGT CGCACTCGAT
ACTCTTTCGC GGTGCGAAGG

3291 CGAAGGGAGA AAGGCGGACA GGTATCCGGT AAGCGGCAGG GTCGGAACAG
GAGAGCGCAC GAGGGAGCTT
GCTTCCCTCT TTCCGCCTGT CCATAGGCCA TTCGCCGTCC CAGCCTTGTC
CTCTCGCGTG CTCCCTCGAA

3361 CCAGGGGGAA ACGCCTGGTA TCTTTATAGT CCTGTCGGGT TTCGCCACCT
CTGACTTGAG CGTCGATTTT
GGTCCCCCTT TGCGGACCAT AGAAATATCA GGACAGCCCA AAGCGGTGGA
GACTGAACTC GCAGCTAAAA

3431 TGTGATGCTC GTCAGGGGGG CGGAGCCTAT GGAAAAACGC CAGCAACGCG
GCCTTTTTAC GGTTCCTGGC
ACACTACGAG CAGTCCCCCC GCCTCGGATA CCTTTTTGCG GTCGTTGCGC
CGGAAAAATG CCAAGGACCG

Fig. 41F

```
    3501  CTTTTGCTGG CCTTTTGCTC ACATGTTCTT TCCTGCGTTA TCCCCTGATT
CTGTGGATAA CCGTATTACC
          GAAAACGACC GGAAAACGAG TGTACAAGAA AGGACGCAAT AGGGGACTAA
GACACCTATT GGCATAATGG

    3571  GCCTTTGAGT GAGCTGATAC CGCTCGCCGC AGCCGAACGA CCGAGCGCAG
CGAGTCAGTG AGCGAGGAAG
          CGGAAACTCA CTCGACTATG GCGAGCGGCG TCGGCTTGCT GGCTCGCGTC
GCTCAGTCAC TCGCTCCTTC

    3641  CGGAAGAGCG CCCAATACGC AAACCGCCTC TCCCCGCGCG TTGGCCGATT
CATTAATGCA GCTGGCACGA
          GCCTTCTCGC GGGTTATGCG TTTGGCGGAG AGGGGCGCGC AACCGGCTAA
GTAATTACGT CGACCGTGCT

    3711  CAGGTTTCCC GACTGGAAAG CGGGCAGTGA GCGCAACGCA ATTAATGTGA
GTTAGCTCAC TCATTAGGCA
          GTCCAAAGGG CTGACCTTTC GCCCGTCACT CGCGTTGCGT TAATTACACT
CAATCGAGTG AGTAATCCGT

    3781  CCCCAGGCTT TACACTTTAT GCTTCCGGCT CGTATGTTGT GTGGAATTGT
GAGCGGATAA CAATTTCACA
          GGGGTCCGAA ATGTGAAATA CGAAGGCCGA GCATACAACA CACCTTAACA
CTCGCCTATT GTTAAAGTGT

                                                BssHII
EcoRI
                                                ~~~~~~
~~
    3851  CAGGAAACAG CTATGACCAT GATTACGCCA AGCGCGCAAT TAACCCTCAC
TAAAGGGAAC AAAAGCTGGA
          GTCCTTTGTC GATACTGGTA CTAATGCGGT TCGCGCGTTA ATTGGGAGTG
ATTTCCCTTG TTTTCGACCT

          EcoRI
          ~~~~
    3921  ATTCCACAAT GAACAATAAT AAGATTAAAA TAGCTTGCCC CCGTTGCAGC
GATGGGTATT TTTTCTAGTA
          TAAGGTGTTA CTTGTTATTA TTCTAATTTT ATCGAACGGG GGCAACGTCG
CTACCCATAA AAAAGATCAT

    3991  AAATAAAAGA TAAACTTAGA CTCAAAACAT TTACAAAAAC AACCCCTAAA
GTCCTAAAGC CCAAAGTGCT
          TTTATTTTCT ATTTGAATCT GAGTTTTGTA AATGTTTTTG TTGGGGATTT
CAGGATTTCG GGTTTCACGA

    4061  ATGCACGATC CATAGCAAGC CCAGCCCAAC CCAACCCAAC CCAACCCACC
CCAGTGCAGC CAACTGGCAA
          TACGTGCTAG GTATCGTTCG GGTCGGGTTG GGTTGGGTTG GGTTGGGTGG
GGTCACGTCG GTTGACCGTT

    4131  ATAGTCTCCA CCCCCGGCAC TATCACCGTG AGTTGTCCGC ACCACCGCAC
GTCTCGCAGC CAAAAAAAAA
```

Fig. 41G

TATCAGAGGT GGGGGCCGTG ATAGTGGCAC TCAACAGGCG TGGTGGCGTG
CAGAGCGTCG GTTTTTTTTT

4201 AAAAGAAAGA AAAAAAAGAA AAAGAAAAAC AGCAGGTGGG TCCGGGTCGT
GGGGGCCGGA AAAGCGAGGA
TTTTCTTTCT TTTTTTTCTT TTTCTTTTTG TCGTCCACCC AGGCCCAGCA
CCCCCGGCCT TTTCGCTCCT

4271 GGATCGCGAG CAGCGACGAG GCCCGGCCCT CCCTCCGCTT CCAAAGAAAC
GCCCCCCATC GCCACTATAT
CCTAGCGCTC GTCGCTGCTC CGGGCCGGGA GGGAGGCGAA GGTTTCTTTG
CGGGGGGTAG CGGTGATATA

4341 ACATACCCCC CCCTCTCCTC CCATCCCCCC AACCCTACCA CCACCACCAC
CACCACCTCC TCCCCCCTCG
TGTATGGGGG GGGAGAGGAG GGTAGGGGGG TTGGGATGGT GGTGGTGGTG
GTGGTGGAGG AGGGGGGAGC

4411 CTGCCGGACG ACGAGCTCCT CCCCCCTCCC CCTCCGCCGC CGCCGGTAAC
CACCCCGCCC CTCTCCTCTT
GACGGCCTGC TGCTCGAGGA GGGGGGAGGG GGAGGCGGCG GCGGCCATTG
GTGGGGCGGG GAGAGGAGAA

4481 TCTTTCTCCG TTTTTTTTTT CGTCTCGGTC TCGATCTTTG GCCTTGGTAG
TTTGGGTGGG CGAGAGCGGC
AGAAAGAGGC AAAAAAAAAA GCAGAGCCAG AGCTAGAAAC CGGAACCATC
AAACCCACCC GCTCTCGCCG

4551 TTCGTCGCCC AGATCGGTGC GCGGGAGGGG CGGGATCTCG CGGCTGGCGT
CTCCGGGCGT GAGTCGGCCC
AAGCAGCGGG TCTAGCCACG CGCCCTCCCC GCCCTAGAGC GCCGACCGCA
GAGGCCCGCA CTCAGCCGGG

BamHI BglII
~~~~~~ ~~~~~~
4621 GGATCCTCGC GGGGAATGGG GCTCTCGGAT GTAGATCTTC TTTCTTTCTT
CTTTTTGTGG TAGAATTTGA
CCTAGGAGCG CCCCTTACCC CGAGAGCCTA CATCTAGAAG AAAGAAAGAA
GAAAAACACC ATCTTAAACT

4691 ATCCCTCAGC ATTGTTCATC GGTAGTTTTT CTTTTCATGA TTTGTGACAA
ATGCAGCCTC GTGCGGAGCT
TAGGGAGTCG TAACAAGTAG CCATCAAAAA GAAAAGTACT AAACACTGTT
TACGTCGGAG CACGCCTCGA

4761 TTTTTGTAGG TAG
AAAAACATCC ATC

Fig. 41 H
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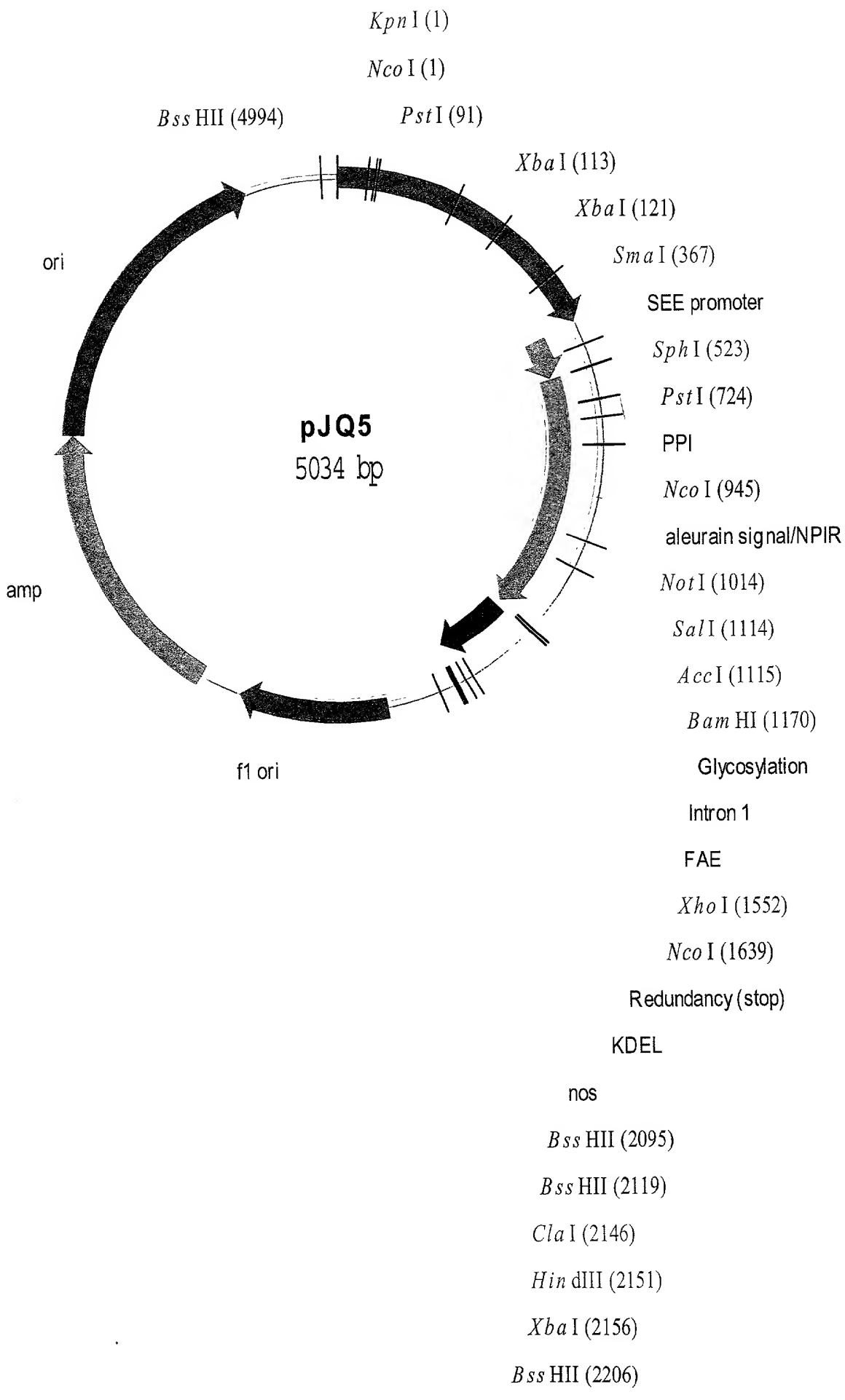
Kpn I (1)
Nco I (1)
Bss HII (4994)
Pst I (91)
Xba I (113)
Xba I (121)
Sma I (367)
SEE promoter
Sph I (523)
Pst I (724)
PPI
Nco I (945)
aleurain signal/NPIR
Not I (1014)
Sal I (1114)
Acc I (1115)
Bam HI (1170)
Glycosylation
Intron 1
FAE
Xho I (1552)
Nco I (1639)
Redundancy (stop)
KDEL
nos
Bss HII (2095)
Bss HII (2119)
Cla I (2146)
Hin dIII (2151)
Xba I (2156)
Bss HII (2206)
ori
amp
f1 ori
pJQ5
5034 bp

Fig. 42A

Sequence for pJQ5

```
          NcoI
          ~~~~~
          KpnI
          ~
       1  CATGGGCCAG GTATAATTAT GGGATATCTC AAGCAAATAA TCGAAATATC
ACCATTGGCT ACAATATCTG
          GTACCCGGTC CATATTAATA CCCTATAGAG TTCGTTTATT AGCTTTATAG
TGGTAACCGA TGTTATAGAC

                            PstI                              XbaI     XbaI
                           ~~~~~~~                           ~~~~~~  ~~~~~~~
      71  AGCTCCGAGT TCTGACTGCA GTCTGGATGA CGCGTGTTGT ATCTAGAACT
CTAGATAGCA CAGCCACAGC
          TCGAGGCTCA AGACTGACGT CAGACCTACT GCGCACAACA TAGATCTTGA
GATCTATCGT GTCGGTGTCG

     141  ACCTACAGGA GTGCGACACT TGTGGACTGT AGTAGTGTTG GAGACGGAGC
TCTTTCCTAC CTCCTGACGT
          TGGATGTCCT CACGCTGTGA ACACCTGACA TCATCACAAC CTCTGCCTCG
AGAAAGGATG GAGGACTGCA

     211  TGCCGCCGTT GTCCATTCCA ACGGCATCAC TCTCAACCAA TCACGCGCTC
CCAACAAAAT ATCGTCCCCC
          ACGGCGGCAA CAGGTAAGGT TGCCGTAGTG AGAGTTGGTT AGTGCGCGAG
GGTTGTTTTA TAGCAGGGGG

     281  ATGTCTTGGC GGAGAGAGAG TACATACATG CTGTCGCGCC GTTTTTGTCT
GAATCTCGCT TCCACTGGCC
          TACAGAACCG CCTCTCTCTC ATGTATGTAC GACAGCGCGG CAAAAACAGA
CTTAGAGCGA AGGTGACCGG

                          SmaI
                         ~~~~~~
     351  AATCAGCTCA GCTCCCGGGA GCTCACTCAT TCAAGATCCC ATCGTCGTCG
TCACCCCTGG CGTCATGGGA
          TTAGTCGAGT CGAGGGCCCT CGAGTGAGTA AGTTCTAGGG TAGCAGCAGC
AGTGGGGACC GCAGTACCCT

     421  TGGAAAAGAA CCTCCGTTGC TCGGATGAGT CAGCCATATC CCCGAACAGA
GTACTGCAAG ATAACCCAAT
          ACCTTTTCTT GGAGGCAACG AGCCTACTCA GTCGGTATAG GGGCTTGTCT
CATGACGTTC TATTGGGTTA

                                        SphI
                                       ~~~~~~~
     491  TCAGATTCCC CCAATAGAGA AAGTATAGCA TGCTTTCGGG TTTTGTTTGG
CTTAATTGAC TTTATTTTTG
          AGTCTAAGGG GGTTATCTCT TTCATATCGT ACGAAAGCCC AAAACAAACC
GAATTAACTG AAATAAAAAC
```

Fig. 42B

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     561  TTGGAGTTGA ATGCTGATTT GTTGTGTAAA ATGCCCAACC ATCTGAATAT
CGAGACGGAT AATAGGCTGG
          AACCTCAACT TACGACTAAA CAACACATTT TACGGGTTGG TAGACTTATA
GCTCTGCCTA TTATCCGACC

     631  CTAATTAATT TATAGCAAGA TTCTGTAGTG CACATCGCAA ATATCTTTCT
GGGCATTACA GCTGGAGGCT
          GATTAATTAA ATATCGTTCT AAGACATCAC GTGTAGCGTT TATAGAAAGA
CCCGTAATGT CGACCTCCGA

                                PstI
                               ~~~~~~~
     701  TCATCAGCCT GAAACACTCT GCAGAGCCTG AAGCAAGTGG TGAAGCGTGG
CGATGAGATG GGTATAAAAC
          AGTAGTCGGA CTTTGTGAGA CGTCTCGGAC TTCGTTCACC ACTTCGCACC
GCTACTCTAC CCATATTTTG

     771  CCCCGGCACC GGGACGCGAG CTCCCGCCTA CCAGTACCAT CTCGCCTCGC
TCCCCCTGCC GGACGACCCA
          GGGGCCGTGG CCCTGCGCTC GAGGGCGGAT GGTCATGGTA GAGCGGAGCG
AGGGGGACGG CCTGCTGGGT

     841  GTAAAATACT GTTGCCCACT CGCCGGCGAG ATGGMCGTGC ACAAGGAGGT
SAACTTCGTS GCCTACCTCC
          CATTTTATGA CAACGGGTGA GCGGCCGCTC TACCKGCACG TGTTCCTCCA
STTGAAGCAS CGGATGGAGG

                                                    NcoI
                                                   ~~~~~~
     911  TGATCGTSCT CGGCCTCCTC TTGCTCGTST CCGCCATGGA GCACGTGGAC
GCCAAGGCCT GCACCCKCGA
          ACTAGCASGA GCCGGAGGAG AACGAGCASA GGCGGTACCT CGTGCACCTG
CGGTTCCGGA CGTGGGMGCT

                                                     NotI
                                                   ~~~~~~~~
     981  GTGCGGCAAC CTCGGCTTCG GCATCTGCCC GGCGGCCGCC TCCACGCAGG
GCATCTCCGA AGACCTCTAC
          CACGCCGTTG GAGCCGAAGC CGTAGACGGG CCGCCGGCGG AGGTGCGTCC
CGTAGAGGCT TCTGGAGATG


SalI

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AccI

~~~~~~
    1051  AGCCGTTTAG TCGAAATGGC CACTATCTCC CAAGCTGCCT ACGCCGACCT
GTGCAACATT CCGTCGACTA
          TCGGCAAATC AGCTTTACCG GTGATAGAGG GTTCGACGGA TGCGGCTGGA
CACGTTGTAA GGCAGCTGAT
```

Fig. 42 C

BamHI
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1121 TTATCAAGGG AGAGAAAATT TACAATTCTC AAACTGACAT TAACGGATGG
ATCCTCCGCG ACGACAGCAG
AATAGTTCCC TCTCTTTTAA ATGTTAAGAG TTTGACTGTA ATTGCCTACC
TAGGAGGCGC TGCTGTCGTC

1191 CAAAGAAATA ATCACCGTCT TCCGTGGCAC TGGTAGTGAT ACGAATCTAC
AACTCGATAC TAACTACACC
GTTTCTTTAT TAGTGGCAGA AGGCACCGTG ACCATCACTA TGCTTAGATG
TTGAGCTATG ATTGATGTGG

1261 CTCACGCCTT TCGACACCCT ACCACAATGC AACGGTTGTG AAGTACACGG
TGGATATTAT ATTGGATGGG
GAGTGCGGAA AGCTGTGGGA TGGTGTTACG TTGCCAACAC TTCATGTGCC
ACCTATAATA TAACCTACCC

1331 TCTCCGTCCA GGACCAAGTC GAGTCGCTTG TCAAACAGCA GGTTAGCCAG
TATCCGGACT ACGCGCTGAC
AGAGGCAGGT CCTGGTTCAG CTCAGCGAAC AGTTTGTCGT CCAATCGGTC
ATAGGCCTGA TGCGCGACTG

1401 CGTGACCGGC CACKCCCTCG GCGCCTCCCT GGCGGCACTC ACTGCCGCCC
AGCTGTCTGC GACATACGAC
GCACTGGCCG GTGMGGGAGC CGCGGAGGGA CCGCCGTGAG TGACGGCGGG
TCGACAGACG CTGTATGCTG

1471 AACATCCGCC TGTACACCTT CGGCGAACCG CGCAGCGGCA ATCAGGCCTT
CGCGTCGTAC ATGAACGATG
TTGTAGGCGG ACATGTGGAA GCCGCTTGGC GCGTCGCCGT TAGTCCGGAA
GCGCAGCATG TACTTGCTAC

XhoI
~~~~~~

1541 CCTTCCAAGC CTCGAGCCCA GATACGACGC AGTATTTCCG GGTCACTCAT
GCCAACGACG GCATCCCAAA
GGAAGGTTCG GAGCTCGGGT CTATGCTGCG TCATAAAGGC CCAGTGAGTA
CGGTTGCTGC CGTAGGGTTT

NcoI
~~~~~~~

1611 CCTGCCCCCG GTGGAGCAGG GGTACGCCCA TGGCGGTGTA GAGTACTGGA
GCGTTGATCC TTACAGCGCC
GGACGGGGGC CACCTCGTCC CCATGCGGGT ACCGCCACAT CTCATGACCT
CGCAACTAGG AATGTCGCGG

1681 CAGAACACAT TTGTCTGCAC TGGGGATGAA GTGCAGTGCT GTGAGGCCCA
GGGCGGACAG GGTGTGAATA
GTCTTGTGTA AACAGACGTG ACCCCTACTT CACGTCACGA CACTCCGGGT
CCCGCCTGTC CCACACTTAT

1751 ATGCGCACAC GACTTATTTT GGGATGACGA GCGGAGCCTG TACATGGTGA
TCAGTCATTT CAGCCTCCCC

Fig. 42 D
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```
          TACGCGTGTG CTGAATAAAA CCCTACTGCT CGCCTCGGAC ATGTACCACT
AGTCAGTAAA GTCGGAGGGG

    1821  GAGTGTACCA GGAAAGATGG ATGTCCTGGA GAGGGGGCCG CGTAACCACT
GAAGGATGAG CTGTAAAGAA
          CTCACATGGT CCTTTCTACC TACAGGACCT CTCCCCCGGC GCATTGGTGA
CTTCCTACTC GACATTTCTT

    1891  GCAGATCGTT CAAACATTTG GCAATAAAGT TTCTTAAGAT TGAATCCTGT
TGCCGGTCTT GCGATGATTA
          CGTCTAGCAA GTTTGTAAAC CGTTATTTCA AAGAATTCTA ACTTAGGACA
ACGGCCAGAA CGCTACTAAT

    1961  TCATATAATT TCTGTTGAAT TACGTTAAGC ATGTAATAAT TAACATGTAA
TGCATGACGT TATTTATGAG
          AGTATATTAA AGACAACTTA ATGCAATTCG TACATTATTA ATTGTACATT
ACGTACTGCA ATAAATACTC


BssHII

~~~~~~
    2031  ATGGGTTTTT ATGATTAGAG TCCCGCAATT ATACATTTAA TACGCGATAG
AAAACAAAAT ATAGCGCGCA
          TACCCAAAAA TACTAATCTC AGGGCGTTAA TATGTAAATT ATGCGCTATC
TTTTGTTTTA TATCGCGCGT


XbaI

~~~~~~
                              BssHII                          ClaI HindIII
                              ~~~~~~~                         ~~~~~~~~~~~~~
    2101  AACTAGGATA AATTATCGCG CGCGGTGTCA TCTATGTTAC TAGATCGATA
AGCTTCTAGA GCGGCCGGTG
          TTGATCCTAT TTAATAGCGC GCGCCACAGT AGATACAATG ATCTAGCTAT
TCGAAGATCT CGCCGGCCAC

                                                  BssHII
                                                  ~~~~~~
    2171  GAGCTCCAAT TCGCCCTATA GTGAGTCGTA TTACGCGCGC TCACTGGCCG
TCGTTTTACA ACGTCGTGAC
          CTCGAGGTTA AGCGGGATAT CACTCAGCAT AATGCGCGCG AGTGACCGGC
AGCAAAATGT TGCAGCACTG

    2241  TGGGAAAACC CTGGCGTTAC CCAACTTAAT CGCCTTGCAG CACATCCCCC
TTTCGCCAGC TGGCGTAATA
          ACCCTTTTGG GACCGCAATG GGTTGAATTA GCGGAACGTC GTGTAGGGGG
AAAGCGGTCG ACCGCATTAT

    2311  GCGAAGAGGC CCGCACCGAT CGCCCTTCCC AACAGTTGCG CAGCCTGAAT
GGCGAATGGG ACGCGCCCTG
          CGCTTCTCCG GCGTGGCTA GCGGGAAGGG TTGTCAACGC GTCGGACTTA
CCGCTTACCC TGCGCGGGAC
```

Fig. 42 E

2381 TAGCGGCGCA TTAAGCGCGG CGGGTGTGGT GGTTACGCGC AGCGTGACCG
CTACACTTGC CAGCGCCCTA
ATCGCCGCGT AATTCGCGCC GCCCACACCA CCAATGCGCG TCGCACTGGC
GATGTGAACG GTCGCGGGAT

2451 GCGCCCGCTC CTTTCGCTTT CTTCCCTTCC TTTCTCGCCA CGTTCGCCGG
CTTTCCCCGT CAAGCTCTAA
CGCGGGCGAG GAAAGCGAAA GAAGGGAAGG AAAGAGCGGT GCAAGCGGCC
GAAAGGGGCA GTTCGAGATT

2521 ATCGGGGGCT CCCTTTAGGG TTCCGATTTA GTGCTTTACG GCACCTCGAC
CCCAAAAAAC TTGATTAGGG
TAGCCCCCGA GGGAAATCCC AAGGCTAAAT CACGAAATGC CGTGGAGCTG
GGGTTTTTTG AACTAATCCC

2591 TGATGGTTCA CGTAGTGGGC CATCGCCCTG ATAGACGGTT TTTCGCCCTT
TGACGTTGGA GTCCACGTTC
ACTACCAAGT GCATCACCCG GTAGCGGGAC TATCTGCCAA AAAGCGGGAA
ACTGCAACCT CAGGTGCAAG

2661 TTTAATAGTG GACTCTTGTT CCAAACTGGA ACAACACTCA ACCCTATCTC
GGTCTATTCT TTTGATTTAT
AAATTATCAC CTGAGAACAA GGTTTGACCT TGTTGTGAGT TGGGATAGAG
CCAGATAAGA AAACTAAATA

2731 AAGGGATTTT GCCGATTTCG GCCTATTGGT TAAAAAATGA GCTGATTTAA
CAAAAATTTA ACGCGAATTT
TTCCCTAAAA CGGCTAAAGC CGGATAACCA ATTTTTTACT CGACTAAATT
GTTTTTAAAT TGCGCTTAAA

2801 TAACAAAATA TTAACGCTTA CAATTTAGGT GGCACTTTTC GGGGAAATGT
GCGCGGAACC CCTATTTGTT
ATTGTTTTAT AATTGCGAAT GTTAAATCCA CCGTGAAAAG CCCCTTTACA
CGCGCCTTGG GGATAAACAA

2871 TATTTTTCTA AATACATTCA AATATGTATC CGCTCATGAG ACAATAACCC
TGATAAATGC TTCAATAATA
ATAAAAAGAT TTATGTAAGT TTATACATAG GCGAGTACTC TGTTATTGGG
ACTATTTACG AAGTTATTAT

2941 TTGAAAAAGG AAGAGTATGA GTATTCAACA TTTCCGTGTC GCCCTTATTC
CCTTTTTTGC GGCATTTTGC
AACTTTTTCC TTCTCATACT CATAAGTTGT AAAGGCACAG CGGGAATAAG
GGAAAAAACG CCGTAAAACG

3011 CTTCCTGTTT TTGCTCACCC AGAAACGCTG GTGAAAGTAA AAGATGCTGA
AGATCAGTTG GGTGCACGAG
GAAGGACAAA AACGAGTGGG TCTTTGCGAC CACTTTCATT TTCTACGACT
TCTAGTCAAC CCACGTGCTC

3081 TGGGTTACAT CGAACTGGAT CTCAACAGCG GTAAGATCCT TGAGAGTTTT
CGCCCCGAAG AACGTTTTCC

Fig. 42 F

ACCCAATGTA GCTTGACCTA GAGTTGTCGC CATTCTAGGA ACTCTCAAAA
GCGGGGCTTC TTGCAAAAGG

3151 AATGATGAGC ACTTTTAAAG TTCTGCTATG TGGCGCGGTA TTATCCCGTA
TTGACGCCGG GCAAGAGCAA
TTACTACTCG TGAAAATTTC AAGACGATAC ACCGCGCCAT AATAGGGCAT
AACTGCGGCC CGTTCTCGTT

3221 CTCGGTCGCC GCATACACTA TTCTCAGAAT GACTTGGTTG AGTACTCACC
AGTCACAGAA AAGCATCTTA
GAGCCAGCGG CGTATGTGAT AAGAGTCTTA CTGAACCAAC TCATGAGTGG
TCAGTGTCTT TTCGTAGAAT

3291 CGGATGGCAT GACAGTAAGA GAATTATGCA GTGCTGCCAT AACCATGAGT
GATAACACTG CGGCCAACTT
GCCTACCGTA CTGTCATTCT CTTAATACGT CACGACGGTA TTGGTACTCA
CTATTGTGAC GCCGGTTGAA

3361 ACTTCTGACA ACGATCGGAG GACCGAAGGA GCTAACCGCT TTTTTGCACA
ACATGGGGGA TCATGTAACT
TGAAGACTGT TGCTAGCCTC CTGGCTTCCT CGATTGGCGA AAAAACGTGT
TGTACCCCCT AGTACATTGA

3431 CGCCTTGATC GTTGGGAACC GGAGCTGAAT GAAGCCATAC CAAACGACGA
GCGTGACACC ACGATGCCTG
GCGGAACTAG CAACCCTTGG CCTCGACTTA CTTCGGTATG GTTTGCTGCT
CGCACTGTGG TGCTACGGAC

3501 TAGCAATGGC AACAACGTTG CGCAAACTAT TAACTGGCGA ACTACTTACT
CTAGCTTCCC GGCAACAATT
ATCGTTACCG TTGTTGCAAC GCGTTTGATA ATTGACCGCT TGATGAATGA
GATCGAAGGG CCGTTGTTAA

3571 AATAGACTGG ATGGAGGCGG ATAAAGTTGC AGGACCACTT CTGCGCTCGG
CCCTTCCGGC TGGCTGGTTT
TTATCTGACC TACCTCCGCC TATTTCAACG TCCTGGTGAA GACGCGAGCC
GGGAAGGCCG ACCGACCAAA

3641 ATTGCTGATA AATCTGGAGC CGGTGAGCGT GGGTCTCGCG GTATCATTGC
AGCACTGGGG CCAGATGGTA
TAACGACTAT TTAGACCTCG GCCACTCGCA CCCAGAGCGC CATAGTAACG
TCGTGACCCC GGTCTACCAT

3711 AGCCCTCCCG TATCGTAGTT ATCTACACGA CGGGGAGTCA GGCAACTATG
GATGAACGAA ATAGACAGAT
TCGGGAGGGC ATAGCATCAA TAGATGTGCT GCCCCTCAGT CCGTTGATAC
CTACTTGCTT TATCTGTCTA

3781 CGCTGAGATA GGTGCCTCAC TGATTAAGCA TTGGTAACTG TCAGACCAAG
TTTACTCATA TATACTTTAG
GCGACTCTAT CCACGGAGTG ACTAATTCGT AACCATTGAC AGTCTGGTTC
AAATGAGTAT ATATGAAATC

Fig. 42 G

3851 ATTGATTTAA AACTTCATTT TTAATTTAAA AGGATCTAGG TGAAGATCCT
TTTTGATAAT CTCATGACCA
TAACTAAATT TTGAAGTAAA AATTAAATTT TCCTAGATCC ACTTCTAGGA
AAAACTATTA GAGTACTGGT

3921 AAATCCCTTA ACGTGAGTTT TCGTTCCACT GAGCGTCAGA CCCCGTAGAA
AAGATCAAAG GATCTTCTTG
TTTAGGGAAT TGCACTCAAA AGCAAGGTGA CTCGCAGTCT GGGGCATCTT
TTCTAGTTTC CTAGAAGAAC

3991 AGATCCTTTT TTTCTGCGCG TAATCTGCTG CTTGCAAACA AAAAAACCAC
CGCTACCAGC GGTGGTTTGT
TCTAGGAAAA AAAGACGCGC ATTAGACGAC GAACGTTTGT TTTTTTGGTG
GCGATGGTCG CCACCAAACA

4061 TTGCCGGATC AAGAGCTACC AACTCTTTTT CCGAAGGTAA CTGGCTTCAG
CAGAGCGCAG ATACCAAATA
AACGGCCTAG TTCTCGATGG TTGAGAAAAA GGCTTCCATT GACCGAAGTC
GTCTCGCGTC TATGGTTTAT

4131 CTGTCCTTCT AGTGTAGCCG TAGTTAGGCC ACCACTTCAA GAACTCTGTA
GCACCGCCTA CATACCTCGC
GACAGGAAGA TCACATCGGC ATCAATCCGG TGGTGAAGTT CTTGAGACAT
CGTGGCGGAT GTATGGAGCG

4201 TCTGCTAATC CTGTTACCAG TGGCTGCTGC CAGTGGCGAT AAGTCGTGTC
TTACCGGGTT GGACTCAAGA
AGACGATTAG GACAATGGTC ACCGACGACG GTCACCGCTA TTCAGCACAG
AATGGCCCAA CCTGAGTTCT

4271 CGATAGTTAC CGGATAAGGC GCAGCGGTCG GGCTGAACGG GGGGTTCGTG
CACACAGCCC AGCTTGGAGC
GCTATCAATG GCCTATTCCG CGTCGCCAGC CCGACTTGCC CCCCAAGCAC
GTGTGTCGGG TCGAACCTCG

4341 GAACGACCTA CACCGAACTG AGATACCTAC AGCGTGAGCT ATGAGAAAGC
GCCACGCTTC CCGAAGGGAG
CTTGCTGGAT GTGGCTTGAC TCTATGGATG TCGCACTCGA TACTCTTTCG
CGGTGCGAAG GGCTTCCCTC

4411 AAAGGCGGAC AGGTATCCGG TAAGCGGCAG GGTCGGAACA GGAGAGCGCA
CGAGGGAGCT TCCAGGGGGA
TTTCCGCCTG TCCATAGGCC ATTCGCCGTC CCAGCCTTGT CCTCTCGCGT
GCTCCCTCGA AGGTCCCCCT

4481 AACGCCTGGT ATCTTTATAG TCCTGTCGGG TTTCGCCACC TCTGACTTGA
GCGTCGATTT TTGTGATGCT
TTGCGGACCA TAGAAATATC AGGACAGCCC AAAGCGGTGG AGACTGAACT
CGCAGCTAAA AACACTACGA

4551 CGTCAGGGGG GCGGAGCCTA TGGAAAAACG CCAGCAACGC GGCCTTTTTA
CGGTTCCTGG CCTTTTGCTG
GCAGTCCCCC CGCCTCGGAT ACCTTTTTGC GGTCGTTGCG CCGGAAAAAT
GCCAAGGACC GGAAAACGAC

Fig. 42 H

4621 GCCTTTTGCT CACATGTTCT TTCCTGCGTT ATCCCCTGAT TCTGTGGATA
ACCGTATTAC CGCCTTTGAG
CGGAAAACGA GTGTACAAGA AAGGACGCAA TAGGGGACTA AGACACCTAT
TGGCATAATG GCGGAAACTC

4691 TGAGCTGATA CCGCTCGCCG CAGCCGAACG ACCGAGCGCA GCGAGTCAGT
GAGCGAGGAA GCGGAAGAGC
ACTCGACTAT GGCGAGCGGC GTCGGCTTGC TGGCTCGCGT CGCTCAGTCA
CTCGCTCCTT CGCCTTCTCG

4761 GCCCAATACG CAAACCGCCT CTCCCCGCGC GTTGGCCGAT TCATTAATGC
AGCTGGCACG ACAGGTTTCC
CGGGTTATGC GTTTGGCGGA GAGGGGCGCG CAACCGGCTA AGTAATTACG
TCGACCGTGC TGTCCAAAGG

4831 CGACTGGAAA GCGGGCAGTG AGCGCAACGC AATTAATGTG AGTTAGCTCA
CTCATTAGGC ACCCCAGGCT
GCTGACCTTT CGCCCGTCAC TCGCGTTGCG TTAATTACAC TCAATCGAGT
GAGTAATCCG TGGGGTCCGA

4901 TTACACTTTA TGCTTCCGGC TCGTATGTTG TGTGGAATTG TGAGCGGATA
ACAATTTCAC ACAGGAAACA
AATGTGAAAT ACGAAGGCCG AGCATACAAC ACACCTTAAC ACTCGCCTAT
TGTTAAAGTG TGTCCTTTGT

NcoI

BssHII

KpnI

~~~~~~

~~~~~

4971 GCTATGACCA TGATTACGCC AAGCGCGCAA TTAACCCTCA CTAAAGGGAA
CAAAAGCTGG GTAC
CGATACTGGT ACTAATGCGG TTCGCGCGTT AATTGGGAGT GATTTCCCTT
GTTTTCGACC CATG

Fig. 42 I

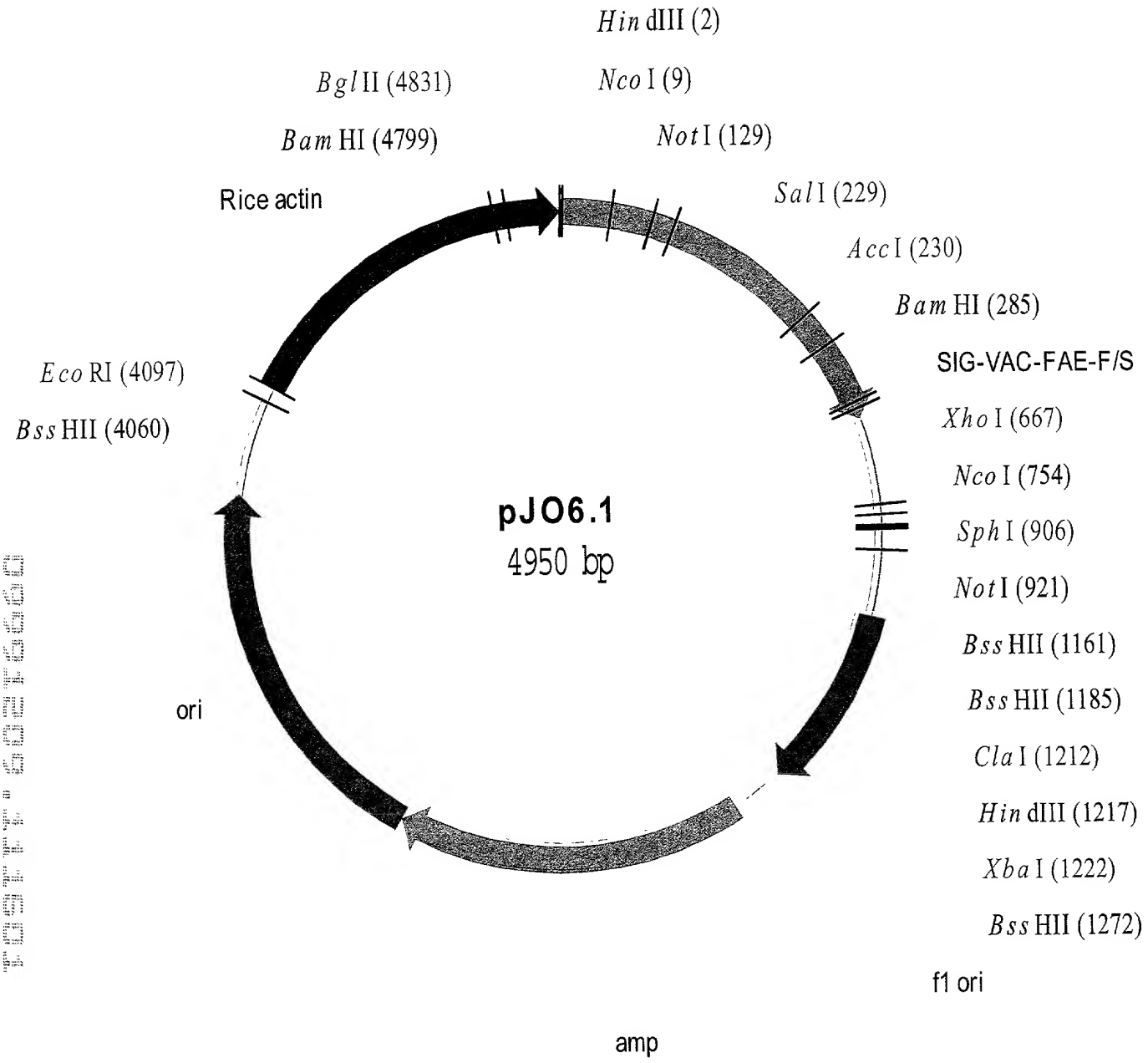
Hin dIII (2)
Nco I (9)
Not I (129)
Sal I (229)
Acc I (230)
Bam HI (285)
SIG-VAC-FAE-F/S
Xho I (667)
Nco I (754)
Sph I (906)
Not I (921)
Bss HII (1161)
Bss HII (1185)
Cla I (1212)
Hin dIII (1217)
Xba I (1222)
Bss HII (1272)
f1 ori
amp
ori
Eco RI (4097)
Bss HII (4060)
Bgl II (4831)
Bam HI (4799)
Rice actin
pJO6.1
4950 bp

Fig. 43A

Sequence for pJO6

```
          HindIII NcoI
          ~~~~~~ ~~~~~~~
       1  AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT
GGCCACGGCC GCCGTCGCCG
          TTCGAATGGT ACCGGGTGCG GGCGCAGGAG GAGGACCGCG AGCGGCACGA
CCGGTGCCGG CGGCAGCGGC


NotI

~~~~~~~~~
      71  TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC
GACCGCGCGG CCGCCTCCAC
          AGCGGAGGAG GAGGAGGAAG CGGCTGAGGT TGGGCTAGGC CGGGCAGTGG
CTGGCGCGCC GGCGGAGGTG

     141  GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA
TCTCCCAAGC TGCCTACGCC
          CGTCCCGTAG AGGCTTCTGG AGATGTCGGC AAATCAGCTT TACCGGTGAT
AGAGGGTTCG ACGGATGCGG

                              SalI
                             ~~~~~~~
                              AccI
                             ~~~~~~~
     211  GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA
TTCTCAAACT GACATTAACG
          CTGGACACGT TGTAAGGCAG CTGATAATAG TTCCCTCTCT TTTAAATGTT
AAGAGTTTGA CTGTAATTGC

              BamHI
             ~~~~~~
     281  GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT
GGCACTGGTA GTGATACGAA
          CTACCTAGGA GGCGCTGCTG TCGTCGTTTC TTTATTAGTG GCAGAAGGCA
CCGTGACCAT CACTATGCTT

     351  TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC
AATGCAACGG TTGTGAAGTA
          AGATGTTGAG CTATGATTGA TGTGGGAGTG CGGAAAGCTG TGGGATGGTG
TTACGTTGCC AACACTTCAT

     421  CACGGTGGAT ATTATATTGG ATGGGTCTCC GTCCAGGACC AAGTCGAGTC
GCTTGTCAAA CAGCAGGTTA
          GTGCCACCTA TAATATAACC TACCCAGAGG CAGGTCCTGG TTCAGCTCAG
CGAACAGTTT GTCGTCCAAT

     491  GCCAGTATCC GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC
TCCCTGGCGG CACTCACTGC
          CGGTCATAGG CCTGATGCGC GACTGGCACT GGCCGGTGMG GGAGCCGCGG
AGGGACCGCC GTGAGTGACG
```

Fig. 43 B

```
     561  CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC ACCTTCGGCG
AACCGCGCAG CGGCAATCAG
          GCGGGTCGAC AGACGCTGTA TGCTGTTGTA GGCGGACATG TGGAAGCCGC
TTGGCGCGTC GCCGTTAGTC

                                                    XhoI
                                                   ~~~~~~~
     631  GCCTTCGCGT CGTACATGAA CGATGCCTTC CAAGCCTCGA GCCCAGATAC
GACGCAGTAT TTCCGGGTCA
          CGGAAGCGCA GCATGTACTT GCTACGGAAG GTTCGGAGCT CGGGTCTATG
CTGCGTCATA AAGGCCCAGT


NcoI

~~~~~~
     701  CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC
GCCCATGGCG GTGTAGAGTA
          GAGTACGGTT GCTGCCGTAG GGTTTGGACG GGGGCCACCT CGTCCCCATG
CGGGTACCGC CACATCTCAT

     771  CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG
ATGAAGTGCA GTGCTGTGAG
          GACCTCGCAA CTAGGAATGT CGCGGGTCTT GTGTAAACAG ACGTGACCCC
TACTTCACGT CACGACACTC


SphI

~~~~~~
     841  GCCCAGGGCG GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT
GACGAGCGGC GCATGCACCT
          CGGGTCCCGC CTGTCCCACA CTTATTACGC GTGTGCTGAA TAAAACCCTA
CTGCTCGCCG CGTACGTGGA

                    NotI
                   ~~~~~~~~~
     911  GGCCGGTCGC GGCCGCGGAA ACCACTGAAG GATGAGCTGT AAAGAAGCAG
ATCGTTCAAA CATTTGGCAA
          CCGGCCAGCG CCGGCGCCTT TGGTGACTTC CTACTCGACA TTTCTTCGTC
TAGCAAGTTT GTAAACCGTT

     981  TAAAGTTTCT TAAGATTGAA TCCTGTTGCC GGTCTTGCGA TGATTATCAT
ATAATTTCTG TTGAATTACG
          ATTTCAAAGA ATTCTAACTT AGGACAACGG CCAGAACGCT ACTAATAGTA
TATTAAAGAC AACTTAATGC

    1051  TTAAGCATGT AATAATTAAC ATGTAATGCA TGACGTTATT TATGAGATGG
GTTTTTATGA TTAGAGTCCC
          AATTCGTACA TTATTAATTG TACATTACGT ACTGCAATAA ATACTCTACC
CAAAAATACT AATCTCAGGG
```

Fig. 43 C

```
                                                          BssHII
BssHII                                                    ~~~~~~~
~~~~~~
    1121  GCAATTATAC ATTTAATACG CGATAGAAAA CAAAATATAG CGCGCAAACT
AGGATAAATT ATCGCGCGCG
          CGTTAATATG TAAATTATGC GCTATCTTTT GTTTTATATC GCGCGTTTGA
TCCTATTTAA TAGCGCGCGC

                                              XbaI
                                              ~~~~~~
                                  ClaI HindIII
                                 ~~~~~~~~~~~~~~~
    1191  GTGTCATCTA TGTTACTAGA TCGATAAGCT TCTAGAGCGG CCGGTGGAGC
TCCAATTCGC CCTATAGTGA
          CACAGTAGAT ACAATGATCT AGCTATTCGA AGATCTCGCC GGCCACCTCG
AGGTTAAGCG GGATATCACT

                       BssHII
                       ~~~~~~
    1261  GTCGTATTAC GCGCGCTCAC TGGCCGTCGT TTTACAACGT CGTGACTGGG
AAAACCCTGG CGTTACCCAA
          CAGCATAATG CGCGCGAGTG ACCGGCAGCA AAATGTTGCA GCACTGACCC
TTTTGGGACC GCAATGGGTT

    1331  CTTAATCGCC TTGCAGCACA TCCCCCTTTC GCCAGCTGGC GTAATAGCGA
AGAGGCCCGC ACCGATCGCC
          GAATTAGCGG AACGTCGTGT AGGGGGAAAG CGGTCGACCG CATTATCGCT
TCTCCGGGCG TGGCTAGCGG

    1401  CTTCCCAACA GTTGCGCAGC CTGAATGGCG AATGGGACGC GCCCTGTAGC
GGCGCATTAA GCGCGGCGGG
          GAAGGGTTGT CAACGCGTCG GACTTACCGC TTACCCTGCG CGGGACATCG
CCGCGTAATT CGCGCCGCCC

    1471  TGTGGTGGTT ACGCGCAGCG TGACCGCTAC ACTTGCCAGC GCCCTAGCGC
CCGCTCCTTT CGCTTTCTTC
          ACACCACCAA TGCGCGTCGC ACTGGCGATG TGAACGGTCG CGGGATCGCG
GGCGAGGAAA GCGAAAGAAG

    1541  CCTTCCTTTC TCGCCACGTT CGCCGGCTTT CCCCGTCAAG CTCTAAATCG
GGGGCTCCCT TTAGGGTTCC
          GGAAGGAAAG AGCGGTGCAA GCGGCCGAAA GGGGCAGTTC GAGATTTAGC
CCCCGAGGGA AATCCCAAGG

    1611  GATTTAGTGC TTTACGGCAC CTCGACCCCA AAAAACTTGA TTAGGGTGAT
GGTTCACGTA GTGGGCCATC
          CTAAATCACG AAATGCCGTG GAGCTGGGGT TTTTTGAACT AATCCCACTA
CCAAGTGCAT CACCCGGTAG

    1681  GCCCTGATAG ACGGTTTTTC GCCCTTTGAC GTTGGAGTCC ACGTTCTTTA
ATAGTGGACT CTTGTTCCAA
          CGGGACTATC TGCCAAAAAG CGGGAAACTG CAACCTCAGG TGCAAGAAAT
TATCACCTGA GAACAAGGTT
```

Fig. 43D

1751 ACTGGAACAA CACTCAACCC TATCTCGGTC TATTCTTTTG ATTTATAAGG
GATTTTGCCG ATTTCGGCCT
TGACCTTGTT GTGAGTTGGG ATAGAGCCAG ATAAGAAAAC TAAATATTCC
CTAAAACGGC TAAAGCCGGA

1821 ATTGGTTAAA AAATGAGCTG ATTTAACAAA AATTTAACGC GAATTTTAAC
AAAATATTAA CGCTTACAAT
TAACCAATTT TTTACTCGAC TAAATTGTTT TTAAATTGCG CTTAAAATTG
TTTTATAATT GCGAATGTTA

1891 TTAGGTGGCA CTTTTCGGGG AAATGTGCGC GGAACCCCTA TTTGTTTATT
TTTCTAAATA CATTCAAATA
AATCCACCGT GAAAAGCCCC TTTACACGCG CCTTGGGGAT AAACAAATAA
AAAGATTTAT GTAAGTTTAT

1961 TGTATCCGCT CATGAGACAA TAACCCTGAT AAATGCTTCA ATAATATTGA
AAAAGGAAGA GTATGAGTAT
ACATAGGCGA GTACTCTGTT ATTGGGACTA TTTACGAAGT TATTATAACT
TTTTCCTTCT CATACTCATA

2031 TCAACATTTC CGTGTCGCCC TTATTCCCTT TTTTGCGGCA TTTTGCCTTC
CTGTTTTTGC TCACCCAGAA
AGTTGTAAAG GCACAGCGGG AATAAGGGAA AAAACGCCGT AAAACGGAAG
GACAAAAACG AGTGGGTCTT

2101 ACGCTGGTGA AAGTAAAAGA TGCTGAAGAT CAGTTGGGTG CACGAGTGGG
TTACATCGAA CTGGATCTCA
TGCGACCACT TTCATTTTCT ACGACTTCTA GTCAACCCAC GTGCTCACCC
AATGTAGCTT GACCTAGAGT

2171 ACAGCGGTAA GATCCTTGAG AGTTTTCGCC CCGAAGAACG TTTTCCAATG
ATGAGCACTT TTAAAGTTCT
TGTCGCCATT CTAGGAACTC TCAAAAGCGG GGCTTCTTGC AAAAGGTTAC
TACTCGTGAA AATTTCAAGA

2241 GCTATGTGGC GCGGTATTAT CCCGTATTGA CGCCGGGCAA GAGCAACTCG
GTCGCCGCAT ACACTATTCT
CGATACACCG CGCCATAATA GGGCATAACT GCGGCCCGTT CTCGTTGAGC
CAGCGGCGTA TGTGATAAGA

2311 CAGAATGACT TGGTTGAGTA CTCACCAGTC ACAGAAAAGC ATCTTACGGA
TGGCATGACA GTAAGAGAAT
GTCTTACTGA ACCAACTCAT GAGTGGTCAG TGTCTTTTCG TAGAATGCCT
ACCGTACTGT CATTCTCTTA

2381 TATGCAGTGC TGCCATAACC ATGAGTGATA ACACTGCGGC CAACTTACTT
CTGACAACGA TCGGAGGACC
ATACGTCACG ACGGTATTGG TACTCACTAT TGTGACGCCG GTTGAATGAA
GACTGTTGCT AGCCTCCTGG

2451 GAAGGAGCTA ACCGCTTTTT TGCACAACAT GGGGGATCAT GTAACTCGCC
TTGATCGTTG GGAACCGGAG

Fig 43 E

CTTCCTCGAT TGGCGAAAAA ACGTGTTGTA CCCCCTAGTA CATTGAGCGG
AACTAGCAAC CCTTGGCCTC

2521 CTGAATGAAG CCATACCAAA CGACGAGCGT GACACCACGA TGCCTGTAGC
AATGGCAACA ACGTTGCGCA
GACTTACTTC GGTATGGTTT GCTGCTCGCA CTGTGGTGCT ACGGACATCG
TTACCGTTGT TGCAACGCGT

2591 AACTATTAAC TGGCGAACTA CTTACTCTAG CTTCCCGGCA ACAATTAATA
GACTGGATGG AGGCGGATAA
TTGATAATTG ACCGCTTGAT GAATGAGATC GAAGGGCCGT TGTTAATTAT
CTGACCTACC TCCGCCTATT

2661 AGTTGCAGGA CCACTTCTGC GCTCGGCCCT TCCGGCTGGC TGGTTTATTG
CTGATAAATC TGGAGCCGGT
TCAACGTCCT GGTGAAGACG CGAGCCGGGA AGGCCGACCG ACCAAATAAC
GACTATTTAG ACCTCGGCCA

2731 GAGCGTGGGT CTCGCGGTAT CATTGCAGCA CTGGGGCCAG ATGGTAAGCC
CTCCCGTATC GTAGTTATCT
CTCGCACCCA GAGCGCCATA GTAACGTCGT GACCCCGGTC TACCATTCGG
GAGGGCATAG CATCAATAGA

2801 ACACGACGGG GAGTCAGGCA ACTATGGATG AACGAAATAG ACAGATCGCT
GAGATAGGTG CCTCACTGAT
TGTGCTGCCC CTCAGTCCGT TGATACCTAC TTGCTTTATC TGTCTAGCGA
CTCTATCCAC GGAGTGACTA

2871 TAAGCATTGG TAACTGTCAG ACCAAGTTTA CTCATATATA CTTTAGATTG
ATTTAAAACT TCATTTTTAA
ATTCGTAACC ATTGACAGTC TGGTTCAAAT GAGTATATAT GAAATCTAAC
TAAATTTTGA AGTAAAAATT

2941 TTTAAAAGGA TCTAGGTGAA GATCCTTTTT GATAATCTCA TGACCAAAAT
CCCTTAACGT GAGTTTTCGT
AAATTTTCCT AGATCCACTT CTAGGAAAAA CTATTAGAGT ACTGGTTTTA
GGGAATTGCA CTCAAAAGCA

3011 TCCACTGAGC GTCAGACCCC GTAGAAAAGA TCAAAGGATC TTCTTGAGAT
CCTTTTTTTC TGCGCGTAAT
AGGTGACTCG CAGTCTGGGG CATCTTTTCT AGTTTCCTAG AAGAACTCTA
GGAAAAAAAG ACGCGCATTA

3081 CTGCTGCTTG CAAACAAAAA AACCACCGCT ACCAGCGGTG GTTTGTTTGC
CGGATCAAGA GCTACCAACT
GACGACGAAC GTTTGTTTTT TTGGTGGCGA TGGTCGCCAC CAAACAAACG
GCCTAGTTCT CGATGGTTGA

3151 CTTTTTCCGA AGGTAACTGG CTTCAGCAGA GCGCAGATAC CAAATACTGT
CCTTCTAGTG TAGCCGTAGT
GAAAAAGGCT TCCATTGACC GAAGTCGTCT CGCGTCTATG GTTTATGACA
GGAAGATCAC ATCGGCATCA

Fig. 43 F

3221 TAGGCCACCA CTTCAAGAAC TCTGTAGCAC CGCCTACATA CCTCGCTCTG
CTAATCCTGT TACCAGTGGC
ATCCGGTGGT GAAGTTCTTG AGACATCGTG GCGGATGTAT GGAGCGAGAC
GATTAGGACA ATGGTCACCG

3291 TGCTGCCAGT GGCGATAAGT CGTGTCTTAC CGGGTTGGAC TCAAGACGAT
AGTTACCGGA TAAGGCGCAG
ACGACGGTCA CCGCTATTCA GCACAGAATG GCCCAACCTG AGTTCTGCTA
TCAATGGCCT ATTCCGCGTC

3361 CGGTCGGGCT GAACGGGGGG TTCGTGCACA CAGCCCAGCT TGGAGCGAAC
GACCTACACC GAACTGAGAT
GCCAGCCCGA CTTGCCCCCC AAGCACGTGT GTCGGGTCGA ACCTCGCTTG
CTGGATGTGG CTTGACTCTA

3431 ACCTACAGCG TGAGCTATGA GAAAGCGCCA CGCTTCCCGA AGGGAGAAAG
GCGGACAGGT ATCCGGTAAG
TGGATGTCGC ACTCGATACT CTTTCGCGGT GCGAAGGGCT TCCCTCTTTC
CGCCTGTCCA TAGGCCATTC

3501 CGGCAGGGTC GGAACAGGAG AGCGCACGAG GGAGCTTCCA GGGGGAAACG
CCTGGTATCT TTATAGTCCT
GCCGTCCCAG CCTTGTCCTC TCGCGTGCTC CCTCGAAGGT CCCCCTTTGC
GGACCATAGA AATATCAGGA

3571 GTCGGGTTTC GCCACCTCTG ACTTGAGCGT CGATTTTTGT GATGCTCGTC
AGGGGGGCGG AGCCTATGGA
CAGCCCAAAG CGGTGGAGAC TGAACTCGCA GCTAAAAACA CTACGAGCAG
TCCCCCCGCC TCGGATACCT

3641 AAAACGCCAG CAACGCGGCC TTTTTACGGT TCCTGGCCTT TTGCTGGCCT
TTTGCTCACA TGTTCTTTCC
TTTTGCGGTC GTTGCGCCGG AAAAATGCCA AGGACCGGAA AACGACCGGA
AAACGAGTGT ACAAGAAAGG

3711 TGCGTTATCC CCTGATTCTG TGGATAACCG TATTACCGCC TTTGAGTGAG
CTGATACCGC TCGCCGCAGC
ACGCAATAGG GGACTAAGAC ACCTATTGGC ATAATGGCGG AAACTCACTC
GACTATGGCG AGCGGCGTCG

3781 CGAACGACCG AGCGCAGCGA GTCAGTGAGC GAGGAAGCGG AAGAGCGCCC
AATACGCAAA CCGCCTCTCC
GCTTGCTGGC TCGCGTCGCT CAGTCACTCG CTCCTTCGCC TTCTCGCGGG
TTATGCGTTT GGCGGAGAGG

3851 CCGCGCGTTG GCCGATTCAT TAATGCAGCT GGCACGACAG GTTTCCCGAC
TGGAAAGCGG GCAGTGAGCG
GGCGCGCAAC CGGCTAAGTA ATTACGTCGA CCGTGCTGTC CAAAGGGCTG
ACCTTTCGCC CGTCACTCGC

3921 CAACGCAATT AATGTGAGTT AGCTCACTCA TTAGGCACCC CAGGCTTTAC
ACTTTATGCT TCCGGCTCGT
GTTGCGTTAA TTACACTCAA TCGAGTGAGT AATCCGTGGG GTCCGAAATG
TGAAATACGA AGGCCGAGCA

Fig 43G

BssHII

~~

3991 ATGTTGTGTG GAATTGTGAG CGGATAACAA TTTCACACAG GAAACAGCTA
TGACCATGAT TACGCCAAGC
TACAACACAC CTTAACACTC GCCTATTGTT AAAGTGTGTC CTTTGTCGAT
ACTGGTACTA ATGCGGTTCG

BssHII EcoRI
~~~~ ~~~~~~~

4061 GCGCAATTAA CCCTCACTAA AGGGAACAAA AGCTGGAATT CCACAATGAA
CAATAATAAG ATTAAAATAG
CGCGTTAATT GGGAGTGATT TCCCTTGTTT TCGACCTTAA GGTGTTACTT
GTTATTATTC TAATTTTATC

4131 CTTGCCCCCG TTGCAGCGAT GGGTATTTTT TCTAGTAAAA TAAAAGATAA
ACTTAGACTC AAAACATTTA
GAACGGGGGC AACGTCGCTA CCCATAAAAA AGATCATTTT ATTTTCTATT
TGAATCTGAG TTTTGTAAAT

4201 CAAAAACAAC CCCTAAAGTC CTAAAGCCCA AAGTGCTATG CACGATCCAT
AGCAAGCCCA GCCCAACCCA
GTTTTTGTTG GGGATTTCAG GATTTCGGGT TTCACGATAC GTGCTAGGTA
TCGTTCGGGT CGGGTTGGGT

4271 ACCCAACCCA ACCCACCCCA GTGCAGCCAA CTGGCAAATA GTCTCCACCC
CCGGCACTAT CACCGTGAGT
TGGGTTGGGT TGGGTGGGGT CACGTCGGTT GACCGTTTAT CAGAGGTGGG
GGCCGTGATA GTGGCACTCA

4341 TGTCCGCACC ACCGCACGTC TCGCAGCCAA AAAAAAAAAA AGAAAGAAAA
AAAAGAAAAA GAAAAACAGC
ACAGGCGTGG TGGCGTGCAG AGCGTCGGTT TTTTTTTTTT TCTTTCTTTT
TTTTCTTTTT CTTTTTGTCG

4411 AGGTGGGTCC GGGTCGTGGG GGCCGGAAAA GCGAGGAGGA TCGCGAGCAG
CGACGAGGCC CGGCCCTCCC
TCCACCCAGG CCCAGCACCC CCGGCCTTTT CGCTCCTCCT AGCGCTCGTC
GCTGCTCCGG GCCGGGAGGG

4481 TCCGCTTCCA AAGAAACGCC CCCCATCGCC ACTATATACA TACCCCCCCC
TCTCCTCCCA TCCCCCCAAC
AGGCGAAGGT TTCTTTGCGG GGGGTAGCGG TGATATATGT ATGGGGGGGG
AGAGGAGGGT AGGGGGGTTG

4551 CCTACCACCA CCACCACCAC CACCTCCTCC CCCCTCGCTG CCGGACGACG
AGCTCCTCCC CCCTCCCCCT
GGATGGTGGT GGTGGTGGTG GTGGAGGAGG GGGGAGCGAC GGCCTGCTGC
TCGAGGAGGG GGGAGGGGGA

4621 CCGCCGCCGC CGGTAACCAC CCCGCCCCTC TCCTCTTTCT TTCTCCGTTT
TTTTTTTCGT CTCGGTCTCG

Fig 43H
~~~~

GGCGGCGGCG GCCATTGGTG GGGCGGGGAG AGGAGAAAGA AAGAGGCAAA
AAAAAAAGCA GAGCCAGAGC

4691 ATCTTTGGCC TTGGTAGTTT GGGTGGGCGA GAGCGGCTTC GTCGCCCAGA
TCGGTGCGCG GGAGGGGCGG
TAGAAACCGG AACCATCAAA CCCACCCGCT CTCGCCGAAG CAGCGGGTCT
AGCCACGCGC CCTCCCCGCC

BamHI
~~~~~~~
BglII
~

4761 GATCTCGCGG CTGGCGTCTC CGGGCGTGAG TCGGCCCGGA TCCTCGCGGG
GAATGGGGCT CTCGGATGTA
CTAGAGCGCC GACCGCAGAG GCCCGCACTC AGCCGGGCCT AGGAGCGCCC
CTTACCCCGA GAGCCTACAT

BglII
~~~~~
4831 GATCTTCTTT CTTTCTTCTT TTTGTGGTAG AATTTGAATC CCTCAGCATT
GTTCATCGGT AGTTTTTCTT
CTAGAAGAAA GAAAGAAGAA AAACACCATC TTAAACTTAG GGAGTCGTAA
CAAGTAGCCA TCAAAAAGAA

4901 TTCATGATTT GTGACAAATG CAGCCTCGTG CGGAGCTTTT TTGTAGGTAG
AAGTACTAAA CACTGTTTAC GTCGGAGCAC GCCTCGAAAA AACATCCATC

Fig 43 I

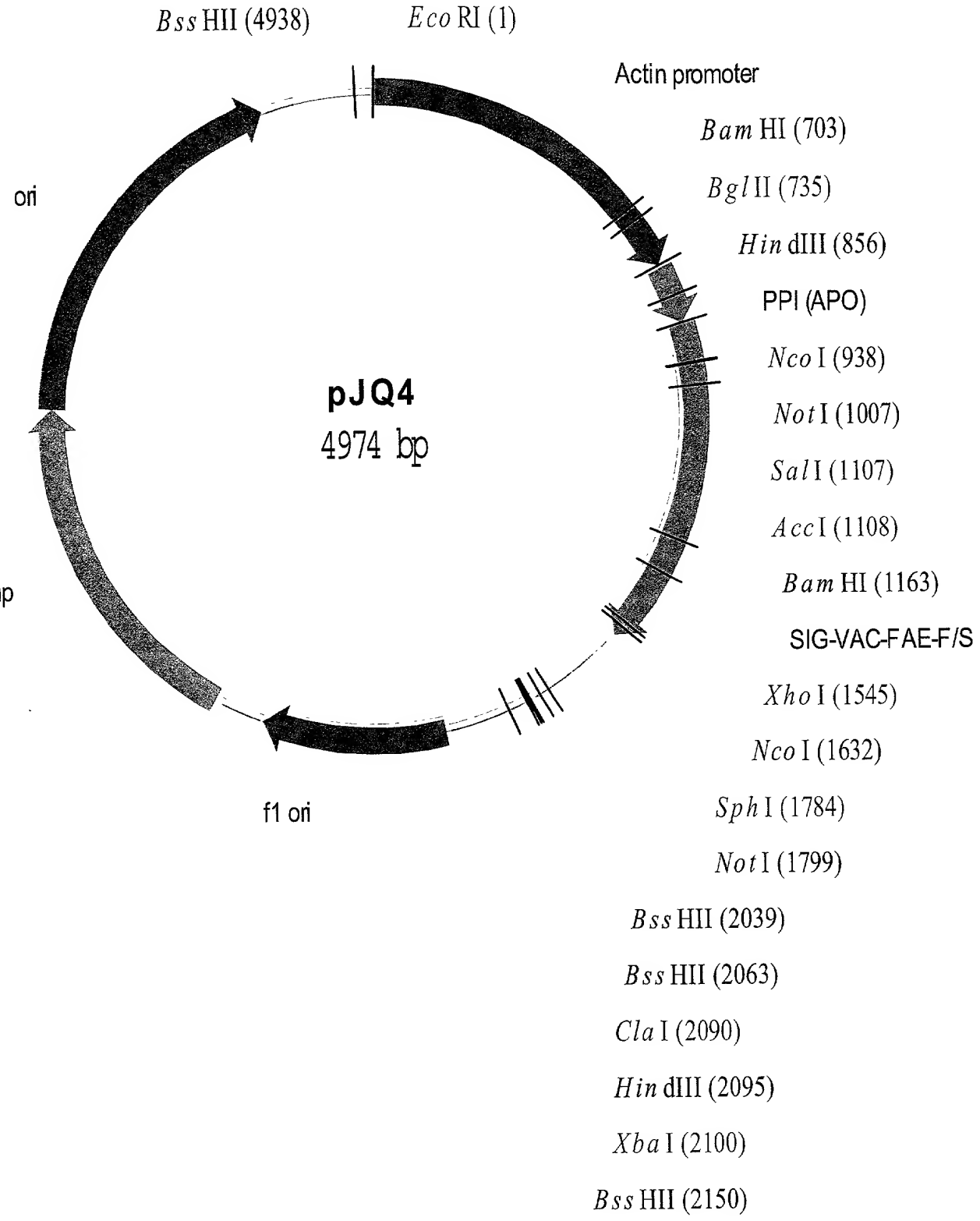
Bss HII (4938)
Eco RI (1)
Actin promoter
Bam HI (703)
Bgl II (735)
Hin dIII (856)
PPI (APO)
Nco I (938)
Not I (1007)
Sal I (1107)
Acc I (1108)
Bam HI (1163)
SIG-VAC-FAE-F/S
Xho I (1545)
Nco I (1632)
Sph I (1784)
Not I (1799)
Bss HII (2039)
Bss HII (2063)
Cla I (2090)
Hin dIII (2095)
Xba I (2100)
Bss HII (2150)
ori
amp
f1 ori
pJQ4
4974 bp

Fig. 44 A

## Sequence for pJQ4

```
          EcoRI
          ~~~~~
       1 AATTCCACAA TGAACAATAA TAAGATTAAA ATAGCTTGCC CCCGTTGCAG
CGATGGGTAT TTTTTCTAGT
          TTAAGGTGTT ACTTGTTATT ATTCTAATTT TATCGAACGG GGGCAACGTC
GCTACCCATA AAAAAGATCA

      71 AAAATAAAAG ATAAACTTAG ACTCAAAACA TTTACAAAAA CAACCCCTAA
AGTCCTAAAG CCCAAAGTGC
          TTTTATTTTC TATTTGAATC TGAGTTTTGT AAATGTTTTT GTTGGGGATT
TCAGGATTTC GGGTTTCACG

     141 TATGCACGAT CCATAGCAAG CCCAGCCCAA CCCAACCCAA CCCAACCCAC
CCCAGTGCAG CCAACTGGCA
          ATACGTGCTA GGTATCGTTC GGGTCGGGTT GGGTTGGGTT GGGTTGGGTG
GGGTCACGTC GGTTGACCGT

     211 AATAGTCTCC ACCCCCGGCA CTATCACCGT GAGTTGTCCG CACCACCGCA
CGTCTCGCAG CCAAAAAAAA
          TTATCAGAGG TGGGGGCCGT GATAGTGGCA CTCAACAGGC GTGGTGGCGT
GCAGAGCGTC GGTTTTTTTT

     281 AAAAAGAAAG AAAAAAAAGA AAAAGAAAAA CAGCAGGTGG GTCCGGGTCG
TGGGGGCCGG AAAAGCGAGG
          TTTTTCTTTC TTTTTTTTCT TTTTCTTTTT GTCGTCCACC CAGGCCCAGC
ACCCCCGGCC TTTTCGCTCC

     351 AGGATCGCGA GCAGCGACGA GGCCCGGCCC TCCCTCCGCT TCCAAAGAAA
CGCCCCCCAT CGCCACTATA
          TCCTAGCGCT CGTCGCTGCT CCGGGCCGGG AGGGAGGCGA AGGTTTCTTT
GCGGGGGGTA GCGGTGATAT

     421 TACATACCCC CCCCTCTCCT CCCATCCCCC CAACCCTACC ACCACCACCA
CCACCACCTC CTCCCCCCTC
          ATGTATGGGG GGGGAGAGGA GGGTAGGGGG GTTGGGATGG TGGTGGTGGT
GGTGGTGGAG GAGGGGGGAG

     491 GCTGCCGGAC GACGAGCTCC TCCCCCCTCC CCCTCCGCCG CCGCCGGTAA
CCACCCCGCC CCTCTCCTCT
          CGACGGCCTG CTGCTCGAGG AGGGGGGAGG GGGAGGCGGC GGCGGCCATT
GGTGGGGCGG GGAGAGGAGA

     561 TTCTTTCTCC GTTTTTTTTT TCGTCTCGGT CTCGATCTTT GGCCTTGGTA
GTTTGGGTGG GCGAGAGCGG
          AAGAAAGAGG CAAAAAAAAA AGCAGAGCCA GAGCTAGAAA CCGGAACCAT
CAAACCCACC CGCTCTCGCC

     631 CTTCGTCGCC CAGATCGGTG CGCGGGAGGG GCGGGATCTC GCGGCTGGCG
TCTCCGGGCG TGAGTCGGCC
```

Fig. 44b

GAAGCAGCGG GTCTAGCCAC GCGCCCTCCC CGCCCTAGAG CGCCGACCGC
AGAGGCCCGC ACTCAGCCGG

BamHI
~~~~~~
BglII
~~~~~~

701 CGGATCCTCG CGGGGAATGG GGCTCTCGGA TGTAGATCTT CTTTCTTTCT
TCTTTTTGTG GTAGAATTTG
GCCTAGGAGC GCCCCTTACC CCGAGAGCCT ACATCTAGAA GAAAGAAAGA
AGAAAAACAC CATCTTAAAC

771 AATCCCTCAG CATTGTTCAT CGGTAGTTTT TCTTTTCATG ATTTGTGACA
AATGCAGCCT CGTGCGGAGC
TTAGGGAGTC GTAACAAGTA GCCATCAAAA AGAAAAGTAC TAAACACTGT
TTACGTCGGA GCACGCCTCG

HindIII
~~~~~~

841 TTTTTTGTAG GTAGAAGCTT ACMATGGMCG TGCACAAGGA GGTSAACTTC
GTSGCCTACC TCCTGATCGT
AAAAAACATC CATCTTCGAA TGKTACCKGC ACGTGTTCCT CCASTTGAAG
CASCGGATGG AGGACTAGCA

NcoI
~~~~~~~

911 SCTCGGCCTC CTCTTGCTCG TSTCCGCCAT GGAGCACGTG GACGCCAAGG
CCTGCACCCK CGAGTGCGGC
SGAGCCGGAG GAGAACGAGC ASAGGCGGTA CCTCGTGCAC CTGCGGTTCC
GGACGTGGGM GCTCACGCCG

NotI
~~~~~~~~~

981 AACCTCGGCT TCGGCATCTG CCCGGCGGCC GCCTCCACGC AGGGCATCTC
CGAAGACCTC TACAGCCGTT
TTGGAGCCGA AGCCGTAGAC GGGCCGCCGG CGGAGGTGCG TCCCGTAGAG
GCTTCTGGAG ATGTCGGCAA

SalI

~~~~~~~

AccI

~~~~~~~
1051 TAGTCGAAAT GGCCACTATC TCCCAAGCTG CCTACGCCGA CCTGTGCAAC
ATTCCGTCGA CTATTATCAA
ATCAGCTTTA CCGGTGATAG AGGGTTCGAC GGATGCGGCT GGACACGTTG
TAAGGCAGCT GATAATAGTT

BamHI
~~~~~~

1121 GGGAGAGAAA ATTTACAATT CTCAAACTGA CATTAACGGA TGGATCCTCC
GCGACGACAG CAGCAAAGAA

Fig. 44C

```
          CCCTCTCTTT TAAATGTTAA GAGTTTGACT GTAATTGCCT ACCTAGGAGG
CGCTGCTGTC GTCGTTTCTT

    1191  ATAATCACCG TCTTCCGTGG CACTGGTAGT GATACGAATC TACAACTCGA
TACTAACTAC ACCCTCACGC
          TATTAGTGGC AGAAGGCACC GTGACCATCA CTATGCTTAG ATGTTGAGCT
ATGATTGATG TGGGAGTGCG

    1261  CTTTCGACAC CCTACCACAA TGCAACGGTT GTGAAGTACA CGGTGGATAT
TATATTGGAT GGGTCTCCGT
          GAAAGCTGTG GGATGGTGTT ACGTTGCCAA CACTTCATGT GCCACCTATA
ATATAACCTA CCCAGAGGCA

    1331  CCAGGACCAA GTCGAGTCGC TTGTCAAACA GCAGGTTAGC CAGTATCCGG
ACTACGCGCT GACCGTGACC
          GGTCCTGGTT CAGCTCAGCG AACAGTTTGT CGTCCAATCG GTCATAGGCC
TGATGCGCGA CTGGCACTGG

    1401  GGCCACKCCC TCGGCGCCTC CCTGGCGGCA CTCACTGCCG CCCAGCTGTC
TGCGACATAC GACAACATCC
          CCGGTGMGGG AGCCGCGGAG GGACCGCCGT GAGTGACGGC GGGTCGACAG
ACGCTGTATG CTGTTGTAGG

    1471  GCCTGTACAC CTTCGGCGAA CCGCGCAGCG GCAATCAGGC CTTCGCGTCG
TACATGAACG ATGCCTTCCA
          CGGACATGTG GAAGCCGCTT GGCGCGTCGC CGTTAGTCCG GAAGCGCAGC
ATGTACTTGC TACGGAAGGT

              XhoI
             ~~~~~~
    1541  AGCCTCGAGC CCAGATACGA CGCAGTATTT CCGGGTCACT CATGCCAACG
ACGGCATCCC AAACCTGCCC
          TCGGAGCTCG GGTCTATGCT GCGTCATAAA GGCCCAGTGA GTACGGTTGC
TGCCGTAGGG TTTGGACGGG

                                   NcoI
                                  ~~~~~~
    1611  CCGGTGGAGC AGGGGTACGC CCATGGCGGT GTAGAGTACT GGAGCGTTGA
TCCTTACAGC GCCCAGAACA
          GGCCACCTCG TCCCCATGCG GGTACCGCCA CATCTCATGA CCTCGCAACT
AGGAATGTCG CGGGTCTTGT

    1681  CATTTGTCTG CACTGGGGAT GAAGTGCAGT GCTGTGAGGC CCAGGGCGGA
CAGGGTGTGA ATAATGCGCA
          GTAAACAGAC GTGACCCCTA CTTCACGTCA CGACACTCCG GGTCCCGCCT
GTCCCACACT TATTACGCGT

                                          SphI                 NotI
                                         ~~~~~~~              ~~~~~~~~~
    1751  CACGACTTAT TTTGGGATGA CGAGCGGCGC ATGCACCTGG CCGGTCGCGG
CCGCGGAAAC CACTGAAGGA
          GTGCTGAATA AAACCCTACT GCTCGCCGCG TACGTGGACC GGCCAGCGCC
GGCGCCTTTG GTGACTTCCT
```

Fig. 44D

1821 TGAGCTGTAA AGAAGCAGAT CGTTCAAACA TTTGGCAATA AAGTTTCTTA
AGATTGAATC CTGTTGCCGG
ACTCGACATT TCTTCGTCTA GCAAGTTTGT AAACCGTTAT TTCAAAGAAT
TCTAACTTAG GACAACGGCC

1891 TCTTGCGATG ATTATCATAT AATTTCTGTT GAATTACGTT AAGCATGTAA
TAATTAACAT GTAATGCATG
AGAACGCTAC TAATAGTATA TTAAAGACAA CTTAATGCAA TTCGTACATT
ATTAATTGTA CATTACGTAC

1961 ACGTTATTTA TGAGATGGGT TTTTATGATT AGAGTCCCGC AATTATACAT
TTAATACGCG ATAGAAAACA
TGCAATAAAT ACTCTACCCA AAAATACTAA TCTCAGGGCG TTAATATGTA
AATTATGCGC TATCTTTTGT

XbaI

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BssHII BssHII

ClaI HindIII

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2031 AAATATAGCG CGCAAACTAG GATAAATTAT CGCGCGCGGT GTCATCTATG
TTACTAGATC GATAAGCTTC
TTTATATCGC GCGTTTGATC CTATTTAATA GCGCGCGCCA CAGTAGATAC
AATGATCTAG CTATTCGAAG

XbaI BssHII

~~~~ ~~~~~~~

2101 TAGAGCGGCC GGTGGAGCTC CAATTCGCCC TATAGTGAGT CGTATTACGC
GCGCTCACTG GCCGTCGTTT
ATCTCGCCGG CCACCTCGAG GTTAAGCGGG ATATCACTCA GCATAATGCG
CGCGAGTGAC CGGCAGCAAA

2171 TACAACGTCG TGACTGGGAA AACCCTGGCG TTACCCAACT TAATCGCCTT
GCAGCACATC CCCCTTTCGC
ATGTTGCAGC ACTGACCCTT TTGGGACCGC AATGGGTTGA ATTAGCGGAA
CGTCGTGTAG GGGGAAAGCG

2241 CAGCTGGCGT AATAGCGAAG AGGCCCGCAC CGATCGCCCT TCCCAACAGT
TGCGCAGCCT GAATGGCGAA
GTCGACCGCA TTATCGCTTC TCCGGGCGTG GCTAGCGGGA AGGGTTGTCA
ACGCGTCGGA CTTACCGCTT

2311 TGGGACGCGC CCTGTAGCGG CGCATTAAGC GCGGCGGGTG TGGTGGTTAC
GCGCAGCGTG ACCGCTACAC
ACCCTGCGCG GGACATCGCC GCGTAATTCG CGCCGCCCAC ACCACCAATG
CGCGTCGCAC TGGCGATGTG

2381 TTGCCAGCGC CCTAGCGCCC GCTCCTTTCG CTTTCTTCCC TTCCTTTCTC
GCCACGTTCG CCGGCTTTCC
AACGGTCGCG GGATCGCGGG CGAGGAAAGC GAAAGAAGGG AAGGAAAGAG
CGGTGCAAGC GGCCGAAAGG

Fig. 44 E
~~~~

2451 CCGTCAAGCT CTAAATCGGG GGCTCCCTTT AGGGTTCCGA TTTAGTGCTT
TACGGCACCT CGACCCCAAA
GGCAGTTCGA GATTTAGCCC CCGAGGGAAA TCCCAAGGCT AAATCACGAA
ATGCCGTGGA GCTGGGGTTT

2521 AAACTTGATT AGGGTGATGG TTCACGTAGT GGGCCATCGC CCTGATAGAC
GGTTTTTCGC CCTTTGACGT
TTTGAACTAA TCCCACTACC AAGTGCATCA CCCGGTAGCG GGACTATCTG
CCAAAAAGCG GGAAACTGCA

2591 TGGAGTCCAC GTTCTTTAAT AGTGGACTCT TGTTCCAAAC TGGAACAACA
CTCAACCCTA TCTCGGTCTA
ACCTCAGGTG CAAGAAATTA TCACCTGAGA ACAAGGTTTG ACCTTGTTGT
GAGTTGGGAT AGAGCCAGAT

2661 TTCTTTTGAT TTATAAGGGA TTTTGCCGAT TTCGGCCTAT TGGTTAAAAA
ATGAGCTGAT TTAACAAAAA
AAGAAAACTA AATATTCCCT AAAACGGCTA AAGCCGGATA ACCAATTTTT
TACTCGACTA AATTGTTTTT

2731 TTTAACGCGA ATTTTAACAA AATATTAACG CTTACAATTT AGGTGGCACT
TTTCGGGGAA ATGTGCGCGG
AAATTGCGCT TAAAATTGTT TTATAATTGC GAATGTTAAA TCCACCGTGA
AAAGCCCCTT TACACGCGCC

2801 AACCCCTATT TGTTTATTTT TCTAAATACA TTCAAATATG TATCCGCTCA
TGAGACAATA ACCCTGATAA
TTGGGGATAA ACAAATAAAA AGATTTATGT AAGTTTATAC ATAGGCGAGT
ACTCTGTTAT TGGGACTATT

2871 ATGCTTCAAT AATATTGAAA AAGGAAGAGT ATGAGTATTC AACATTTCCG
TGTCGCCCTT ATTCCCTTTT
TACGAAGTTA TTATAACTTT TTCCTTCTCA TACTCATAAG TTGTAAAGGC
ACAGCGGGAA TAAGGGAAAA

2941 TTGCGGCATT TTGCCTTCCT GTTTTTGCTC ACCCAGAAAC GCTGGTGAAA
GTAAAAGATG CTGAAGATCA
AACGCCGTAA AACGGAAGGA CAAAAACGAG TGGGTCTTTG CGACCACTTT
CATTTTCTAC GACTTCTAGT

3011 GTTGGGTGCA CGAGTGGGTT ACATCGAACT GGATCTCAAC AGCGGTAAGA
TCCTTGAGAG TTTTCGCCCC
CAACCCACGT GCTCACCCAA TGTAGCTTGA CCTAGAGTTG TCGCCATTCT
AGGAACTCTC AAAAGCGGGG

3081 GAAGAACGTT TTCCAATGAT GAGCACTTTT AAAGTTCTGC TATGTGGCGC
GGTATTATCC CGTATTGACG
CTTCTTGCAA AAGGTTACTA CTCGTGAAAA TTTCAAGACG ATACACCGCG
CCATAATAGG GCATAACTGC

3151 CCGGGCAAGA GCAACTCGGT CGCCGCATAC ACTATTCTCA GAATGACTTG
GTTGAGTACT CACCAGTCAC

Fig. 44F

GGCCCGTTCT CGTTGAGCCA GCGGCGTATG TGATAAGAGT CTTACTGAAC
CAACTCATGA GTGGTCAGTG

3221 AGAAAAGCAT CTTACGGATG GCATGACAGT AAGAGAATTA TGCAGTGCTG
CCATAACCAT GAGTGATAAC
TCTTTTCGTA GAATGCCTAC CGTACTGTCA TTCTCTTAAT ACGTCACGAC
GGTATTGGTA CTCACTATTG

3291 ACTGCGGCCA ACTTACTTCT GACAACGATC GGAGGACCGA AGGAGCTAAC
CGCTTTTTTG CACAACATGG
TGACGCCGGT TGAATGAAGA CTGTTGCTAG CCTCCTGGCT TCCTCGATTG
GCGAAAAAAC GTGTTGTACC

3361 GGGATCATGT AACTCGCCTT GATCGTTGGG AACCGGAGCT GAATGAAGCC
ATACCAAACG ACGAGCGTGA
CCCTAGTACA TTGAGCGGAA CTAGCAACCC TTGGCCTCGA CTTACTTCGG
TATGGTTTGC TGCTCGCACT

3431 CACCACGATG CCTGTAGCAA TGGCAACAAC GTTGCGCAAA CTATTAACTG
GCGAACTACT TACTCTAGCT
GTGGTGCTAC GGACATCGTT ACCGTTGTTG CAACGCGTTT GATAATTGAC
CGCTTGATGA ATGAGATCGA

3501 TCCCGGCAAC AATTAATAGA CTGGATGGAG GCGGATAAAG TTGCAGGACC
ACTTCTGCGC TCGGCCCTTC
AGGGCCGTTG TTAATTATCT GACCTACCTC CGCCTATTTC AACGTCCTGG
TGAAGACGCG AGCCGGGAAG

3571 CGGCTGGCTG GTTTATTGCT GATAAATCTG GAGCCGGTGA GCGTGGGTCT
CGCGGTATCA TTGCAGCACT
GCCGACCGAC CAAATAACGA CTATTTAGAC CTCGGCCACT CGCACCCAGA
GCGCCATAGT AACGTCGTGA

3641 GGGGCCAGAT GGTAAGCCCT CCCGTATCGT AGTTATCTAC ACGACGGGGA
GTCAGGCAAC TATGGATGAA
CCCCGGTCTA CCATTCGGGA GGGCATAGCA TCAATAGATG TGCTGCCCCT
CAGTCCGTTG ATACCTACTT

3711 CGAAATAGAC AGATCGCTGA GATAGGTGCC TCACTGATTA AGCATTGGTA
ACTGTCAGAC CAAGTTTACT
GCTTTATCTG TCTAGCGACT CTATCCACGG AGTGACTAAT TCGTAACCAT
TGACAGTCTG GTTCAAATGA

3781 CATATATACT TTAGATTGAT TTAAAACTTC ATTTTTAATT TAAAAGGATC
TAGGTGAAGA TCCTTTTTGA
GTATATATGA AATCTAACTA AATTTTGAAG TAAAAATTAA ATTTTCCTAG
ATCCACTTCT AGGAAAAACT

3851 TAATCTCATG ACCAAAATCC CTTAACGTGA GTTTTCGTTC CACTGAGCGT
CAGACCCCGT AGAAAAGATC
ATTAGAGTAC TGGTTTTAGG GAATTGCACT CAAAAGCAAG GTGACTCGCA
GTCTGGGGCA TCTTTTCTAG

Fig. 44 G

3921 AAAGGATCTT CTTGAGATCC TTTTTTTCTG CGCGTAATCT GCTGCTTGCA
AACAAAAAAA CCACCGCTAC
TTTCCTAGAA GAACTCTAGG AAAAAAAGAC GCGCATTAGA CGACGAACGT
TTGTTTTTTT GGTGGCGATG

3991 CAGCGGTGGT TTGTTTGCCG GATCAAGAGC TACCAACTCT TTTTCCGAAG
GTAACTGGCT TCAGCAGAGC
GTCGCCACCA AACAAACGGC CTAGTTCTCG ATGGTTGAGA AAAAGGCTTC
CATTGACCGA AGTCGTCTCG

4061 GCAGATACCA AATACTGTCC TTCTAGTGTA GCCGTAGTTA GGCCACCACT
TCAAGAACTC TGTAGCACCG
CGTCTATGGT TTATGACAGG AAGATCACAT CGGCATCAAT CCGGTGGTGA
AGTTCTTGAG ACATCGTGGC

4131 CCTACATACC TCGCTCTGCT AATCCTGTTA CCAGTGGCTG CTGCCAGTGG
CGATAAGTCG TGTCTTACCG
GGATGTATGG AGCGAGACGA TTAGGACAAT GGTCACCGAC GACGGTCACC
GCTATTCAGC ACAGAATGGC

4201 GGTTGGACTC AAGACGATAG TTACCGGATA AGGCGCAGCG GTCGGGCTGA
ACGGGGGGTT CGTGCACACA
CCAACCTGAG TTCTGCTATC AATGGCCTAT TCCGCGTCGC CAGCCCGACT
TGCCCCCCAA GCACGTGTGT

4271 GCCCAGCTTG GAGCGAACGA CCTACACCGA ACTGAGATAC CTACAGCGTG
AGCTATGAGA AAGCGCCACG
CGGGTCGAAC CTCGCTTGCT GGATGTGGCT TGACTCTATG GATGTCGCAC
TCGATACTCT TTCGCGGTGC

4341 CTTCCCGAAG GGAGAAAGGC GGACAGGTAT CCGGTAAGCG GCAGGGTCGG
AACAGGAGAG CGCACGAGGG
GAAGGGCTTC CCTCTTTCCG CCTGTCCATA GGCCATTCGC CGTCCCAGCC
TTGTCCTCTC GCGTGCTCCC

4411 AGCTTCCAGG GGGAAACGCC TGGTATCTTT ATAGTCCTGT CGGGTTTCGC
CACCTCTGAC TTGAGCGTCG
TCGAAGGTCC CCCTTTGCGG ACCATAGAAA TATCAGGACA GCCCAAAGCG
GTGGAGACTG AACTCGCAGC

4481 ATTTTTGTGA TGCTCGTCAG GGGGGCGGAG CCTATGGAAA AACGCCAGCA
ACGCGGCCTT TTTACGGTTC
TAAAAACACT ACGAGCAGTC CCCCCGCCTC GGATACCTTT TTGCGGTCGT
TGCGCCGGAA AAATGCCAAG

4551 CTGGCCTTTT GCTGGCCTTT TGCTCACATG TTCTTTCCTG CGTTATCCCC
TGATTCTGTG GATAACCGTA
GACCGGAAAA CGACCGGAAA ACGAGTGTAC AAGAAAGGAC GCAATAGGGG
ACTAAGACAC CTATTGGCAT

4621 TTACCGCCTT TGAGTGAGCT GATACCGCTC GCCGCAGCCG AACGACCGAG
CGCAGCGAGT CAGTGAGCGA
AATGGCGGAA ACTCACTCGA CTATGGCGAG CGGCGTCGGC TTGCTGGCTC
GCGTCGCTCA GTCACTCGCT

Fig. 44 H

```
    4691  GGAAGCGGAA GAGCGCCCAA TACGCAAACC GCCTCTCCCC GCGCGTTGGC
CGATTCATTA ATGCAGCTGG
          CCTTCGCCTT CTCGCGGGTT ATGCGTTTGG CGGAGAGGGG CGCGCAACCG
GCTAAGTAAT TACGTCGACC

    4761  CACGACAGGT TTCCCGACTG GAAAGCGGGC AGTGAGCGCA ACGCAATTAA
TGTGAGTTAG CTCACTCATT
          GTGCTGTCCA AAGGGCTGAC CTTTCGCCCG TCACTCGCGT TGCGTTAATT
ACACTCAATC GAGTGAGTAA

    4831  AGGCACCCCA GGCTTTACAC TTTATGCTTC CGGCTCGTAT GTTGTGTGGA
ATTGTGAGCG GATAACAATT
          TCCGTGGGGT CCGAAATGTG AAATACGAAG GCCGAGCATA CAACACACCT
TAACACTCGC CTATTGTTAA

                                                      BssHII
                                                      ~~~~~~~
    4901  TCACACAGGA AACAGCTATG ACCATGATTA CGCCAAGCGC GCAATTAACC
CTCACTAAAG GGAACAAAAG
          AGTGTGTCCT TTGTCGATAC TGGTACTAAT GCGGTTCGCG CGTTAATTGG
GAGTGATTTC CCTTGTTTTC

          EcoR

    4971  CTGG
          GACC
```

Fig. 44 I

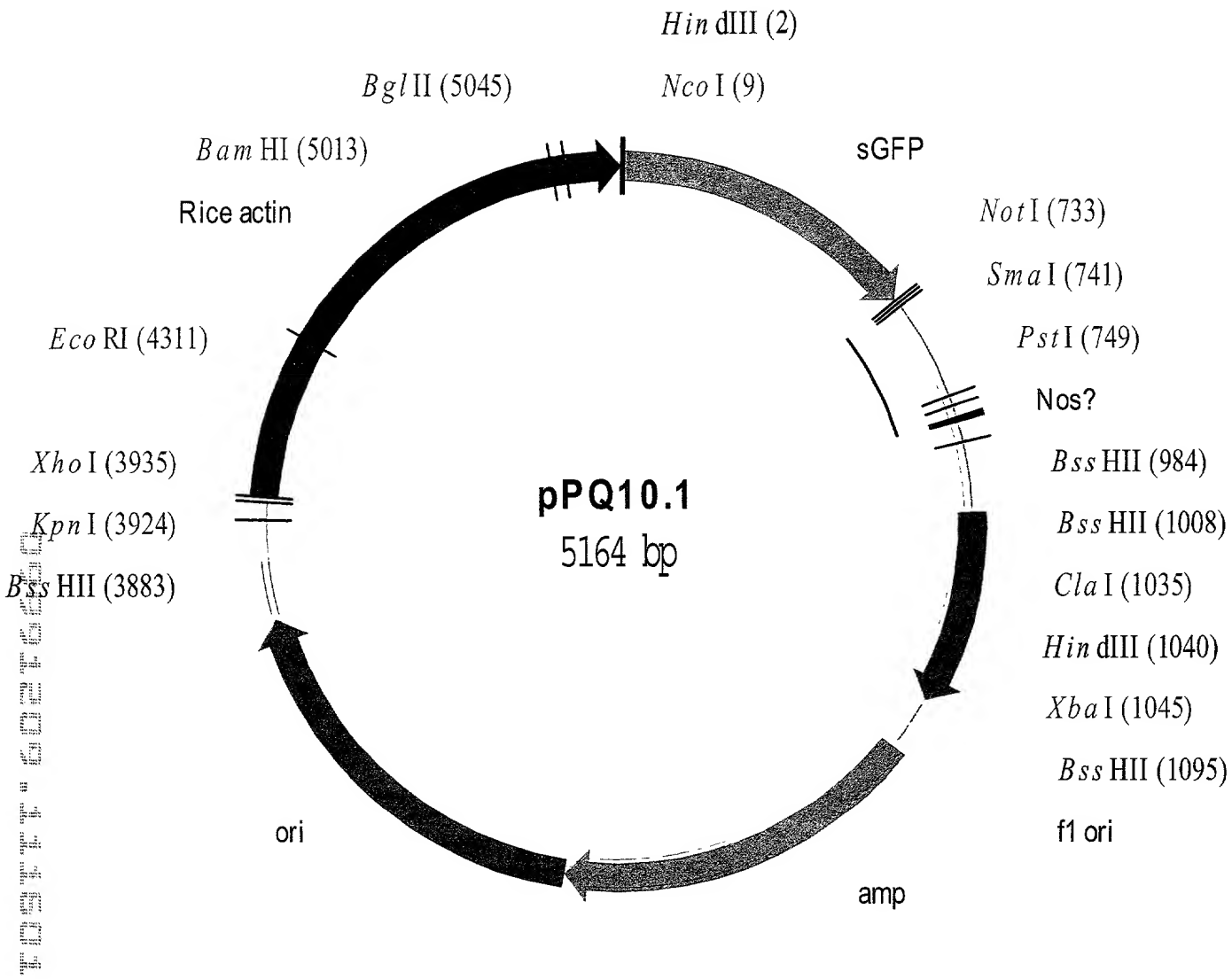
Hin dIII (2)
Nco I (9)
Bgl II (5045)
Bam HI (5013)
Rice actin
sGFP
Not I (733)
Sma I (741)
Pst I (749)
Nos?
Eco RI (4311)
Xho I (3935)
Kpn I (3924)
Bss HII (3883)
pPQ10.1
5164 bp
Bss HII (984)
Bss HII (1008)
Cla I (1035)
Hin dIII (1040)
Xba I (1045)
Bss HII (1095)
f1 ori
ori
amp

Fig. 45A

Sequence for pPQ10.1

```
          HindIII NcoI
          ~~~~~~ ~~~~~~~
       1  AAGCTTACCA TGGTGAGCAA GGGCGAGGAG CTGTTCACCG GGGTGGTGCC
CATCCTGGTC GAGCTGGACG
          TTCGAATGGT ACCACTCGTT CCCGCTCCTC GACAAGTGGC CCCACCACGG
GTAGGACCAG CTCGACCTGC

      71  GCGACGTGAA CGGCCACAAG TTCAGCGTGT CCGGCGAGGG CGAGGGCGAT
GCCACCTACG GCAAGCTGAC
          CGCTGCACTT GCCGGTGTTC AAGTCGCACA GGCCGCTCCC GCTCCCGCTA
CGGTGGATGC CGTTCGACTG

     141  CCTGAAGTTC ATCTGCACCA CCGGCAAGCT GCCCGTGCCC TGGCCCACCC
TCGTGACCAC CTTCACCTAC
          GGACTTCAAG TAGACGTGGT GGCCGTTCGA CGGGCACGGG ACCGGGTGGG
AGCACTGGTG GAAGTGGATG

     211  GGCGTGCAGT GCTTCAGCCG CTACCCCGAC CACATGAAGC AGCACGACTT
CTTCAAGTCC GCCATGCCCG
          CCGCACGTCA CGAAGTCGGC GATGGGGCTG GTGTACTTCG TCGTGCTGAA
GAAGTTCAGG CGGTACGGGC

     281  AAGGCTACGT CCAGGAGCGC ACCATCTTCT TCAAGGACGA CGGCAACTAC
AAGACCCGCG CCGAGGTGAA
          TTCCGATGCA GGTCCTCGCG TGGTAGAAGA AGTTCCTGCT GCCGTTGATG
TTCTGGGCGC GGCTCCACTT

     351  GTTCGAGGGC GACACCCTGG TGAACCGCAT CGAGCTGAAG GGCATCGACT
TCAAGGAGGA CGGCAACATC
          CAAGCTCCCG CTGTGGGACC ACTTGGCGTA GCTCGACTTC CCGTAGCTGA
AGTTCCTCCT GCCGTTGTAG

     421  CTGGGGCACA AGCTGGAGTA CAACTACAAC AGCCACAACG TCTATATCAT
GGCCGACAAG CAGAAGAACG
          GACCCCGTGT TCGACCTCAT GTTGATGTTG TCGGTGTTGC AGATATAGTA
CCGGCTGTTC GTCTTCTTGC

     491  GCATCAAGGT GAACTTCAAG ATCCGCCACA ACATCGAGGA CGGCAGCGTG
CAGCTCGCCG ACCACTACCA
          CGTAGTTCCA CTTGAAGTTC TAGGCGGTGT TGTAGCTCCT GCCGTCGCAC
GTCGAGCGGC TGGTGATGGT

     561  GCAGAACACC CCCATCGGCG ACGGCCCCGT GCTGCTGCCC GACAACCACT
ACCTGAGCAC CCAGTCCGCC
          CGTCTTGTGG GGGTAGCCGC TGCCGGGGCA CGACGACGGG CTGTTGGTGA
TGGACTCGTG GGTCAGGCGG

     631  CTGAGCAAAG ACCCCAACGA GAAGCGCGAT CACATGGTCC TGCTGGAGTT
CGTGACCGCC GCCGGGATCA
```

Fig. 45B

CCGCATTATC GCTTCTCCGG GCGTGGCTAG CGGGAAGGGT TGTCAACGCG
TCGGACTTAC CGCTTACCCT

1261 CGCGCCCTGT AGCGGCGCAT TAAGCGCGGC GGGTGTGGTG GTTACGCGCA
GCGTGACCGC TACACTTGCC
GCGCGGGACA TCGCCGCGTA ATTCGCGCCG CCCACACCAC CAATGCGCGT
CGCACTGGCG ATGTGAACGG

1331 AGCGCCCTAG CGCCCGCTCC TTTCGCTTTC TTCCCTTCCT TTCTCGCCAC
GTTCGCCGGC TTTCCCCGTC
TCGCGGGATC GCGGGCGAGG AAAGCGAAAG AAGGGAAGGA AAGAGCGGTG
CAAGCGGCCG AAAGGGGCAG

1401 AAGCTCTAAA TCGGGGGCTC CCTTTAGGGT TCCGATTTAG TGCTTTACGG
CACCTCGACC CCAAAAAACT
TTCGAGATTT AGCCCCCGAG GGAAATCCCA AGGCTAAATC ACGAAATGCC
GTGGAGCTGG GGTTTTTTGA

1471 TGATTAGGGT GATGGTTCAC GTAGTGGGCC ATCGCCCTGA TAGACGGTTT
TTCGCCCTTT GACGTTGGAG
ACTAATCCCA CTACCAAGTG CATCACCCGG TAGCGGGACT ATCTGCCAAA
AAGCGGGAAA CTGCAACCTC

1541 TCCACGTTCT TTAATAGTGG ACTCTTGTTC CAAACTGGAA CAACACTCAA
CCCTATCTCG GTCTATTCTT
AGGTGCAAGA AATTATCACC TGAGAACAAG GTTTGACCTT GTTGTGAGTT
GGGATAGAGC CAGATAAGAA

1611 TTGATTTATA AGGGATTTTG CCGATTTCGG CCTATTGGTT AAAAAATGAG
CTGATTTAAC AAAAATTTAA
AACTAAATAT TCCCTAAAAC GGCTAAAGCC GGATAACCAA TTTTTTACTC
GACTAAATTG TTTTTAAATT

1681 CGCGAATTTT AACAAAATAT TAACGCTTAC AATTTAGGTG GCACTTTTCG
GGGAAATGTG CGCGGAACCC
GCGCTTAAAA TTGTTTTATA ATTGCGAATG TTAAATCCAC CGTGAAAAGC
CCCTTTACAC GCGCCTTGGG

1751 CTATTTGTTT ATTTTTCTAA ATACATTCAA ATATGTATCC GCTCATGAGA
CAATAACCCT GATAAATGCT
GATAAACAAA TAAAAAGATT TATGTAAGTT TATACATAGG CGAGTACTCT
GTTATTGGGA CTATTTACGA

1821 TCAATAATAT TGAAAAAGGA AGAGTATGAG TATTCAACAT TTCCGTGTCG
CCCTTATTCC CTTTTTTGCG
AGTTATTATA ACTTTTTCCT TCTCATACTC ATAAGTTGTA AAGGCACAGC
GGGAATAAGG GAAAAAACGC

1891 GCATTTTGCC TTCCTGTTTT TGCTCACCCA GAAACGCTGG TGAAAGTAAA
AGATGCTGAA GATCAGTTGG
CGTAAAACGG AAGGACAAAA ACGAGTGGGT CTTTGCGACC ACTTTCATTT
TCTACGACTT CTAGTCAACC

Fig. 45C

1961 GTGCACGAGT GGGTTACATC GAACTGGATC TCAACAGCGG TAAGATCCTT
GAGAGTTTTC GCCCCGAAGA
CACGTGCTCA CCCAATGTAG CTTGACCTAG AGTTGTCGCC ATTCTAGGAA
CTCTCAAAAG CGGGGCTTCT

2031 ACGTTTTCCA ATGATGAGCA CTTTTAAAGT TCTGCTATGT GGCGCGGTAT
TATCCCGTAT TGACGCCGGG
TGCAAAAGGT TACTACTCGT GAAAATTTCA AGACGATACA CCGCGCCATA
ATAGGGCATA ACTGCGGCCC

2101 CAAGAGCAAC TCGGTCGCCG CATACACTAT TCTCAGAATG ACTTGGTTGA
GTACTCACCA GTCACAGAAA
GTTCTCGTTG AGCCAGCGGC GTATGTGATA AGAGTCTTAC TGAACCAACT
CATGAGTGGT CAGTGTCTTT

2171 AGCATCTTAC GGATGGCATG ACAGTAAGAG AATTATGCAG TGCTGCCATA
ACCATGAGTG ATAACACTGC
TCGTAGAATG CCTACCGTAC TGTCATTCTC TTAATACGTC ACGACGGTAT
TGGTACTCAC TATTGTGACG

2241 GGCCAACTTA CTTCTGACAA CGATCGGAGG ACCGAAGGAG CTAACCGCTT
TTTTGCACAA CATGGGGGAT
CCGGTTGAAT GAAGACTGTT GCTAGCCTCC TGGCTTCCTC GATTGGCGAA
AAAACGTGTT GTACCCCCTA

2311 CATGTAACTC GCCTTGATCG TTGGGAACCG GAGCTGAATG AAGCCATACC
AAACGACGAG CGTGACACCA
GTACATTGAG CGGAACTAGC AACCCTTGGC CTCGACTTAC TTCGGTATGG
TTTGCTGCTC GCACTGTGGT

2381 CGATGCCTGT AGCAATGGCA ACAACGTTGC GCAAACTATT AACTGGCGAA
CTACTTACTC TAGCTTCCCG
GCTACGGACA TCGTTACCGT TGTTGCAACG CGTTTGATAA TTGACCGCTT
GATGAATGAG ATCGAAGGGC

2451 GCAACAATTA ATAGACTGGA TGGAGGCGGA TAAAGTTGCA GGACCACTTC
TGCGCTCGGC CCTTCCGGCT
CGTTGTTAAT TATCTGACCT ACCTCCGCCT ATTTCAACGT CCTGGTGAAG
ACGCGAGCCG GGAAGGCCGA

2521 GGCTGGTTTA TTGCTGATAA ATCTGGAGCC GGTGAGCGTG GGTCTCGCGG
TATCATTGCA GCACTGGGGC
CCGACCAAAT AACGACTATT TAGACCTCGG CCACTCGCAC CCAGAGCGCC
ATAGTAACGT CGTGACCCCG

2591 CAGATGGTAA GCCCTCCCGT ATCGTAGTTA TCTACACGAC GGGGAGTCAG
GCAACTATGG ATGAACGAAA
GTCTACCATT CGGGAGGGCA TAGCATCAAT AGATGTGCTG CCCCTCAGTC
CGTTGATACC TACTTGCTTT

2661 TAGACAGATC GCTGAGATAG GTGCCTCACT GATTAAGCAT TGGTAACTGT
CAGACCAAGT TTACTCATAT
ATCTGTCTAG CGACTCTATC CACGGAGTGA CTAATTCGTA ACCATTGACA
GTCTGGTTCA AATGAGTATA

Fig. 45D

2731 ATACTTTAGA TTGATTTAAA ACTTCATTTT TAATTTAAAA GGATCTAGGT
GAAGATCCTT TTTGATAATC
TATGAAATCT AACTAAATTT TGAAGTAAAA ATTAAATTTT CCTAGATCCA
CTTCTAGGAA AAACTATTAG

2801 TCATGACCAA AATCCCTTAA CGTGAGTTTT CGTTCCACTG AGCGTCAGAC
CCCGTAGAAA AGATCAAAGG
AGTACTGGTT TTAGGGAATT GCACTCAAAA GCAAGGTGAC TCGCAGTCTG
GGGCATCTTT TCTAGTTTCC

2871 ATCTTCTTGA GATCCTTTTT TTCTGCGCGT AATCTGCTGC TTGCAAACAA
AAAAACCACC GCTACCAGCG
TAGAAGAACT CTAGGAAAAA AAGACGCGCA TTAGACGACG AACGTTTGTT
TTTTTGGTGG CGATGGTCGC

2941 GTGGTTTGTT TGCCGGATCA AGAGCTACCA ACTCTTTTTC CGAAGGTAAC
TGGCTTCAGC AGAGCGCAGA
CACCAAACAA ACGGCCTAGT TCTCGATGGT TGAGAAAAAG GCTTCCATTG
ACCGAAGTCG TCTCGCGTCT

3011 TACCAAATAC TGTCCTTCTA GTGTAGCCGT AGTTAGGCCA CCACTTCAAG
AACTCTGTAG CACCGCCTAC
ATGGTTTATG ACAGGAAGAT CACATCGGCA TCAATCCGGT GGTGAAGTTC
TTGAGACATC GTGGCGGATG

3081 ATACCTCGCT CTGCTAATCC TGTTACCAGT GGCTGCTGCC AGTGGCGATA
AGTCGTGTCT TACCGGGTTG
TATGGAGCGA GACGATTAGG ACAATGGTCA CCGACGACGG TCACCGCTAT
TCAGCACAGA ATGGCCCAAC

3151 GACTCAAGAC GATAGTTACC GGATAAGGCG CAGCGGTCGG GCTGAACGGG
GGGTTCGTGC ACACAGCCCA
CTGAGTTCTG CTATCAATGG CCTATTCCGC GTCGCCAGCC CGACTTGCCC
CCCAAGCACG TGTGTCGGGT

3221 GCTTGGAGCG AACGACCTAC ACCGAACTGA GATACCTACA GCGTGAGCTA
TGAGAAAGCG CCACGCTTCC
CGAACCTCGC TTGCTGGATG TGGCTTGACT CTATGGATGT CGCACTCGAT
ACTCTTTCGC GGTGCGAAGG

3291 CGAAGGGAGA AAGGCGGACA GGTATCCGGT AAGCGGCAGG GTCGGAACAG
GAGAGCGCAC GAGGGAGCTT
GCTTCCCTCT TTCCGCCTGT CCATAGGCCA TTCGCCGTCC CAGCCTTGTC
CTCTCGCGTG CTCCCTCGAA

3361 CCAGGGGGAA ACGCCTGGTA TCTTTATAGT CCTGTCGGGT TTCGCCACCT
CTGACTTGAG CGTCGATTTT
GGTCCCCCTT TGCGGACCAT AGAAATATCA GGACAGCCCA AAGCGGTGGA
GACTGAACTC GCAGCTAAAA

3431 TGTGATGCTC GTCAGGGGGG CGGAGCCTAT GGAAAAACGC CAGCAACGCG
GCCTTTTTAC GGTTCCTGGC

Fig. 45E

ACACTACGAG CAGTCCCCCC GCCTCGGATA CCTTTTTGCG GTCGTTGCGC
CGGAAAAATG CCAAGGACCG

3501 CTTTTGCTGG CCTTTTGCTC ACATGTTCTT TCCTGCGTTA TCCCCTGATT
CTGTGGATAA CCGTATTACC
GAAAACGACC GGAAAACGAG TGTACAAGAA AGGACGCAAT AGGGGACTAA
GACACCTATT GGCATAATGG

3571 GCCTTTGAGT GAGCTGATAC CGCTCGCCGC AGCCGAACGA CCGAGCGCAG
CGAGTCAGTG AGCGAGGAAG
CGGAAACTCA CTCGACTATG GCGAGCGGCG TCGGCTTGCT GGCTCGCGTC
GCTCAGTCAC TCGCTCCTTC

3641 CGGAAGAGCG CCCAATACGC AAACCGCCTC TCCCCGCGCG TTGGCCGATT
CATTAATGCA GCTGGCACGA
GCCTTCTCGC GGGTTATGCG TTTGGCGGAG AGGGGCGCGC AACCGGCTAA
GTAATTACGT CGACCGTGCT

3711 CAGGTTTCCC GACTGGAAAG CGGGCAGTGA GCGCAACGCA ATTAATGTGA
GTTAGCTCAC TCATTAGGCA
GTCCAAAGGG CTGACCTTTC GCCCGTCACT CGCGTTGCGT TAATTACACT
CAATCGAGTG AGTAATCCGT

3781 CCCCAGGCTT TACACTTTAT GCTTCCGGCT CGTATGTTGT GTGGAATTGT
GAGCGGATAA CAATTTCACA
GGGGTCCGAA ATGTGAAATA CGAAGGCCGA GCATACAACA CACCTTAACA
CTCGCCTATT GTTAAAGTGT

BssHII
KpnI
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3851 CAGGAAACAG CTATGACCAT GATTACGCCA AGCGCGCAAT TAACCCTCAC
TAAAGGGAAC AAAAGCTGGG
GTCCTTTGTC GATACTGGTA CTAATGCGGT TCGCGCGTTA ATTGGGAGTG
ATTTCCCTTG TTTTCGACCC

KpnI XhoI
~~~~ ~~~~~~
3921 TACCGGGCCC CCCCTCGAGG TCATTCATAT GCTTGAGAAG AGAGTCGGGA
TAGTCCAAAA TAAAACAAAG
ATGGCCCGGG GGGGAGCTCC AGTAAGTATA CGAACTCTTC TCTCAGCCCT
ATCAGGTTTT ATTTTGTTTC

3991 GTAAGATTAC CTGGTCAAAA GTGAAAACAT CAGTTAAAAG GTGGTATAAG
TAAAATATCG GTAATAAAAG
CATTCTAATG GACCAGTTTT CACTTTTGTA GTCAATTTTC CACCATATTC
ATTTTATAGC CATTATTTTC

4061 GTGGCCCAAA GTGAAATTTA CTCTTTTCTA CTATTATAAA AATTGAGGAT
GTTTTGTCGG TACTTTGATA
CACCGGGTTT CACTTTAAAT GAGAAAAGAT GATAATATTT TTAACTCCTA
CAAAACAGCC ATGAAACTAT

Fig. 45F

4131 CGTCATTTTT GTATGAATTG GTTTTTAAGT TTATTCGCGA TTTGGAAATG
CATATCTGTA TTTGAGTCGG
GCAGTAAAAA CATACTTAAC CAAAAATTCA AATAAGCGCT AAACCTTTAC
GTATAGACAT AAACTCAGCC

4201 TTTTTAAGTT CGTTGCTTTT GTAAATACAG AGGGATTTGT ATAAGAAATA
TCTTTAAAAA ACCCATATGC
AAAAATTCAA GCAACGAAAA CATTTATGTC TCCCTAAACA TATTCTTTAT
AGAAATTTTT TGGGTATACG

EcoRI
~~~~~~~

4271 TAATTTGACA TAATTTTTGA GAAAAATATA TATTCAGGCG AATTCCACAA
TGAACAATAA TAAGATTAAA
ATTAAACTGT ATTAAAAACT CTTTTTATAT ATAAGTCCGC TTAAGGTGTT
ACTTGTTATT ATTCTAATTT

4341 ATAGCTTGCC CCCGTTGCAG CGATGGGTAT TTTTTCTAGT AAAATAAAAG
ATAAACTTAG ACTCAAAACA
TATCGAACGG GGGCAACGTC GCTACCCATA AAAAAGATCA TTTTATTTTC
TATTTGAATC TGAGTTTTGT

4411 TTTACAAAAA CAACCCCTAA AGTCCTAAAG CCCAAAGTGC TATGCACGAT
CCATAGCAAG CCCAGCCCAA
AAATGTTTTT GTTGGGGATT TCAGGATTTC GGGTTTCACG ATACGTGCTA
GGTATCGTTC GGGTCGGGTT

4481 CCCAACCCAA CCCAACCCAC CCCAGTGCAG CCAACTGGCA AATAGTCTCC
ACCCCCGGCA CTATCACCGT
GGGTTGGGTT GGGTTGGGTG GGGTCACGTC GGTTGACCGT TTATCAGAGG
TGGGGGCCGT GATAGTGGCA

4551 GAGTTGTCCG CACCACCGCA CGTCTCGCAG CCAAAAAAAA AAAAAGAAAG
AAAAAAAAGA AAAAGAAAAA
CTCAACAGGC GTGGTGGCGT GCAGAGCGTC GGTTTTTTTT TTTTTCTTTC
TTTTTTTTCT TTTTCTTTTT

4621 CAGCAGGTGG GTCCGGGTCG TGGGGGCCGG AAAAGCGAGG AGGATCGCGA
GCAGCGACGA GGCCCGGCCC
GTCGTCCACC CAGGCCCAGC ACCCCCGGCC TTTTCGCTCC TCCTAGCGCT
CGTCGCTGCT CCGGGCCGGG

4691 TCCCTCCGCT TCCAAAGAAA CGCCCCCCAT CGCCACTATA TACATACCCC
CCCCTCTCCT CCCATCCCCC
AGGGAGGCGA AGGTTTCTTT GCGGGGGGTA GCGGTGATAT ATGTATGGGG
GGGGAGAGGA GGGTAGGGGG

4761 CAACCCTACC ACCACCACCA CCACCACCTC CTCCCCCCTC GCTGCCGGAC
GACGAGCTCC TCCCCCCTCC
GTTGGGATGG TGGTGGTGGT GGTGGTGGAG GAGGGGGGAG CGACGGCCTG
CTGCTCGAGG AGGGGGGAGG

4831 CCCTCCGCCG CCGCCGGTAA CCACCCCGCC CCTCTCCTCT TTCTTTCTCC
GTTTTTTTTT TCGTCTCGGT

Fig. 45 G
~~~~~~~

GGGAGGCGGC GGCGGCCATT GGTGGGGCGG GGAGAGGAGA AAGAAAGAGG
CAAAAAAAAA AGCAGAGCCA

4901 CTCGATCTTT GGCCTTGGTA GTTTGGGTGG GCGAGAGCGG CTTCGTCGCC
CAGATCGGTG CGCGGGAGGG
GAGCTAGAAA CCGGAACCAT CAAACCCACC CGCTCTCGCC GAAGCAGCGG
GTCTAGCCAC GCGCCCTCCC

BamHI
~~~~~~

4971 GCGGGATCTC GCGGCTGGCG TCTCCGGGCG TGAGTCGGCC CGGATCCTCG
CGGGGAATGG GGCTCTCGGA
CGCCCTAGAG CGCCGACCGC AGAGGCCCGC ACTCAGCCGG GCCTAGGAGC
GCCCCTTACC CCGAGAGCCT

BglII
~~~~~~

5041 TGTAGATCTT CTTTCTTTCT TCTTTTTGTG GTAGAATTTG AATCCCTCAG
CATTGTTCAT CGGTAGTTTT
ACATCTAGAA GAAAGAAAGA AGAAAAACAC CATCTTAAAC TTAGGGAGTC
GTAACAAGTA GCCATCAAAA

5111 TCTTTTCATG ATTTGTGACA AATGCAGCCT CGTGCGGAGC TTTTTTGTAG GTAG
AGAAAAGTAC TAAACACTGT TTACGTCGGA GCACGCCTCG AAAAAACATC CATC

Fig. 45H

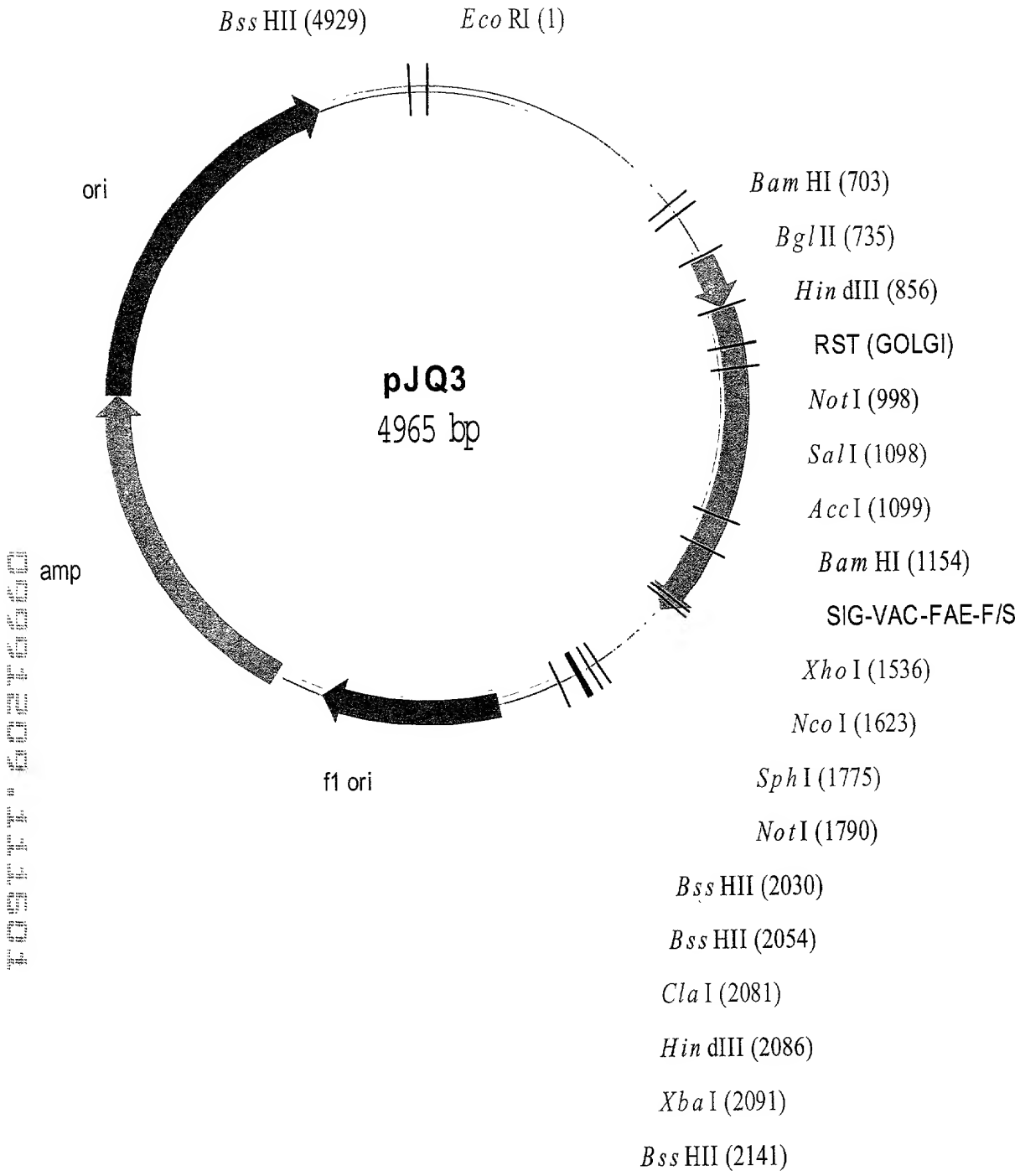
Bss HII (4929)
Eco RI (1)
ori
Bam HI (703)
Bgl II (735)
Hin dIII (856)
RST (GOLGI)
pJQ3
4965 bp
Not I (998)
Sal I (1098)
Acc I (1099)
Bam HI (1154)
SIG-VAC-FAE-F/S
amp
Xho I (1536)
Nco I (1623)
Sph I (1775)
f1 ori
Not I (1790)
Bss HII (2030)
Bss HII (2054)
Cla I (2081)
Hin dIII (2086)
Xba I (2091)
Bss HII (2141)

Fig. 4GA

Sequence for pJQ3

```
          EcoRI
          ~~~~~
       1  AATTCCACAA TGAACAATAA TAAGATTAAA ATAGCTTGCC CCCGTTGCAG
CGATGGGTAT TTTTTCTAGT
          TTAAGGTGTT ACTTGTTATT ATTCTAATTT TATCGAACGG GGGCAACGTC
GCTACCCATA AAAAAGATCA

      71  AAAATAAAAG ATAAACTTAG ACTCAAAACA TTTACAAAAA CAACCCCTAA
AGTCCTAAAG CCCAAAGTGC
          TTTTATTTTC TATTTGAATC TGAGTTTTGT AAATGTTTTT GTTGGGGATT
TCAGGATTTC GGGTTTCACG

     141  TATGCACGAT CCATAGCAAG CCCAGCCCAA CCCAACCCAA CCCAACCCAC
CCCAGTGCAG CCAACTGGCA
          ATACGTGCTA GGTATCGTTC GGGTCGGGTT GGGTTGGGTT GGGTTGGGTG
GGGTCACGTC GGTTGACCGT

     211  AATAGTCTCC ACCCCCGGCA CTATCACCGT GAGTTGTCCG CACCACCGCA
CGTCTCGCAG CCAAAAAAAA
          TTATCAGAGG TGGGGGCCGT GATAGTGGCA CTCAACAGGC GTGGTGGCGT
GCAGAGCGTC GGTTTTTTTT

     281  AAAAAGAAAG AAAAAAAAGA AAAAGAAAAA CAGCAGGTGG GTCCGGGTCG
TGGGGGCCGG AAAAGCGAGG
          TTTTTCTTTC TTTTTTTTCT TTTTCTTTTT GTCGTCCACC CAGGCCCAGC
ACCCCCGGCC TTTTCGCTCC

     351  AGGATCGCGA GCAGCGACGA GGCCCGGCCC TCCCTCCGCT TCCAAAGAAA
CGCCCCCCAT CGCCACTATA
          TCCTAGCGCT CGTCGCTGCT CCGGGCCGGG AGGGAGGCGA AGGTTTCTTT
GCGGGGGGTA GCGGTGATAT

     421  TACATACCCC CCCCTCTCCT CCCATCCCCC CAACCCTACC ACCACCACCA
CCACCACCTC CTCCCCCCTC
          ATGTATGGGG GGGGAGAGGA GGGTAGGGGG GTTGGGATGG TGGTGGTGGT
GGTGGTGGAG GAGGGGGGAG

     491  GCTGCCGGAC GACGAGCTCC TCCCCCCTCC CCCTCCGCCG CCGCCGGTAA
CCACCCCGCC CCTCTCCTCT
          CGACGGCCTG CTGCTCGAGG AGGGGGGAGG GGGAGGCGGC GGCGGCCATT
GGTGGGGCGG GGAGAGGAGA

     561  TTCTTTCTCC GTTTTTTTTT TCGTCTCGGT CTCGATCTTT GGCCTTGGTA
GTTTGGGTGG GCGAGAGCGG
          AAGAAAGAGG CAAAAAAAAA AGCAGAGCCA GAGCTAGAAA CCGGAACCAT
CAAACCCACC CGCTCTCGCC

     631  CTTCGTCGCC CAGATCGGTG CGCGGGAGGG GCGGGATCTC GCGGCTGGCG
TCTCCGGGCG TGAGTCGGCC
```

Fig. 46B

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          GAAGCAGCGG GTCTAGCCAC GCGCCCTCCC CGCCCTAGAG CGCCGACCGC
AGAGGCCCGC ACTCAGCCGG

            BamHI                                   BglII
            ~~~~~~                                  ~~~~~~
     701  CGGATCCTCG CGGGGAATGG GGCTCTCGGA TGTAGATCTT CTTTCTTTCT
TCTTTTTGTG GTAGAATTTG
          GCCTAGGAGC GCCCCTTACC CCGAGAGCCT ACATCTAGAA GAAAGAAAGA
AGAAAAACAC CATCTTAAAC

     771  AATCCCTCAG CATTGTTCAT CGGTAGTTTT TCTTTTCATG ATTTGTGACA
AATGCAGCCT CGTGCGGAGC
          TTAGGGAGTC GTAACAAGTA GCCATCAAAA AGAAAAGTAC TAAACACTGT
TTACGTCGGA GCACGCCTCG

                        HindIII
                        ~~~~~~
     841  TTTTTTGTAG GTAGAAGCTT ACCATGATCC ACACCAACCT CAAAAAGAAG
TTCTCCCTCT TCATCCTCGT
          AAAAAACATC CATCTTCGAA TGGTACTAGG TGTGGTTGGA GTTTTTCTTC
AAGAGGGAGA AGTAGGAGCA

     911  CTTCCTCCTC TTCGCCGTGA TCTGCGTGTG GAAGAAGGGC TCCGACTACG
AGGCCCTCAC CCTCCAAGCC
          GAAGGAGGAG AAGCGGCACT AGACGCACAC CTTCTTCCCG AGGCTGATGC
TCCGGGAGTG GGAGGTTCGG

                           NotI
                           ~~~~~~~~~
     981  AAGGAGTTCC AAATGGCGGC CGCCTCCACG CAGGGCATCT CCGAAGACCT
CTACAGCCGT TTAGTCGAAA
          TTCCTCAAGG TTTACCGCCG GCGGAGGTGC GTCCCGTAGA GGCTTCTGGA
GATGTCGGCA AATCAGCTTT

                                                          SalI
                                                          ~~~~~~~
                                                          AccI
                                                          ~~~~~~~
    1051  TGGCCACTAT CTCCCAAGCT GCCTACGCCG ACCTGTGCAA CATTCCGTCG
ACTATTATCA AGGGAGAGAA
          ACCGGTGATA GAGGGTTCGA CGGATGCGGC TGGACACGTT GTAAGGCAGC
TGATAATAGT TCCCTCTCTT

                                                  BamHI
                                                  ~~~~~~
    1121  AATTTACAAT TCTCAAACTG ACATTAACGG ATGGATCCTC CGCGACGACA
GCAGCAAAGA AATAATCACC
          TTAAATGTTA AGAGTTTGAC TGTAATTGCC TACCTAGGAG GCGCTGCTGT
CGTCGTTTCT TTATTAGTGG

    1191  GTCTTCCGTG GCACTGGTAG TGATACGAAT CTACAACTCG ATACTAACTA
CACCCTCACG CCTTTCGACA
          CAGAAGGCAC CGTGACCATC ACTATGCTTA GATGTTGAGC TATGATTGAT
GTGGGAGTGC GGAAAGCTGT
```

Fig. 46 C

1261 CCCTACCACA ATGCAACGGT TGTGAAGTAC ACGGTGGATA TTATATTGGA
TGGGTCTCCG TCCAGGACCA
GGGATGGTGT TACGTTGCCA ACACTTCATG TGCCACCTAT AATATAACCT
ACCCAGAGGC AGGTCCTGGT

1331 AGTCGAGTCG CTTGTCAAAC AGCAGGTTAG CCAGTATCCG GACTACGCGC
TGACCGTGAC CGGCCACKCC
TCAGCTCAGC GAACAGTTTG TCGTCCAATC GGTCATAGGC CTGATGCGCG
ACTGGCACTG GCCGGTGMGG

1401 CTCGGCGCCT CCCTGGCGGC ACTCACTGCC GCCCAGCTGT CTGCGACATA
CGACAACATC CGCCTGTACA
GAGCCGCGGA GGGACCGCCG TGAGTGACGG CGGGTCGACA GACGCTGTAT
GCTGTTGTAG GCGGACATGT

XhoI

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1471 CCTTCGGCGA ACCGCGCAGC GGCAATCAGG CCTTCGCGTC GTACATGAAC
GATGCCTTCC AAGCCTCGAG
GGAAGCCGCT TGGCGCGTCG CCGTTAGTCC GGAAGCGCAG CATGTACTTG
CTACGGAAGG TTCGGAGCTC

1541 CCCAGATACG ACGCAGTATT TCCGGGTCAC TCATGCCAAC GACGGCATCC
CAAACCTGCC CCCGGTGGAG
GGGTCTATGC TGCGTCATAA AGGCCCAGTG AGTACGGTTG CTGCCGTAGG
GTTTGGACGG GGGCCACCTC

NcoI
~~~~~~
1611 CAGGGGTACG CCCATGGCGG TGTAGAGTAC TGGAGCGTTG ATCCTTACAG
CGCCCAGAAC ACATTTGTCT
GTCCCCATGC GGGTACCGCC ACATCTCATG ACCTCGCAAC TAGGAATGTC
GCGGGTCTTG TGTAAACAGA

1681 GCACTGGGGA TGAAGTGCAG TGCTGTGAGG CCCAGGGCGG ACAGGGTGTG
AATAATGCGC ACACGACTTA
CGTGACCCCT ACTTCACGTC ACGACACTCC GGGTCCCGCC TGTCCCACAC
TTATTACGCG TGTGCTGAAT

SphI NotI
~~~~~~~ ~~~~~~~~~
1751 TTTTGGGATG ACGAGCGGCG CATGCACCTG GCCGGTCGCG GCCGCGGAAA
CCACTGAAGG ATGAGCTGTA
AAAACCCTAC TGCTCGCCGC GTACGTGGAC CGGCCAGCGC CGGCGCCTTT
GGTGACTTCC TACTCGACAT

1821 AAGAAGCAGA TCGTTCAAAC ATTTGGCAAT AAAGTTTCTT AAGATTGAAT
CCTGTTGCCG GTCTTGCGAT
TTCTTCGTCT AGCAAGTTTG TAAACCGTTA TTTCAAAGAA TTCTAACTTA
GGACAACGGC CAGAACGCTA

Fig. 46D
~~~~~~~

1891 GATTATCATA TAATTTCTGT TGAATTACGT TAAGCATGTA ATAATTAACA
TGTAATGCAT GACGTTATTT
CTAATAGTAT ATTAAAGACA ACTTAATGCA ATTCGTACAT TATTAATTGT
ACATTACGTA CTGCAATAAA

BssHII

~~
1961 ATGAGATGGG TTTTTATGAT TAGAGTCCCG CAATTATACA TTTAATACGC
GATAGAAAAC AAAATATAGC
TACTCTACCC AAAAATACTA ATCTCAGGGC GTTAATATGT AAATTATGCG
CTATCTTTTG TTTTATATCG

XbaI

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BssHII BssHII ClaI
HindIII
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~~~~~~~~~~~~~
2031 GCGCAAACTA GGATAAATTA TCGCGCGCGG TGTCATCTAT GTTACTAGAT
CGATAAGCTT CTAGAGCGGC
CGCGTTTGAT CCTATTTAAT AGCGCGCGCC ACAGTAGATA CAATGATCTA
GCTATTCGAA GATCTCGCCG

BssHII
~~~~~~~
2101 CGGTGGAGCT CCAATTCGCC CTATAGTGAG TCGTATTACG CGCGCTCACT
GGCCGTCGTT TTACAACGTC
GCCACCTCGA GGTTAAGCGG GATATCACTC AGCATAATGC GCGCGAGTGA
CCGGCAGCAA AATGTTGCAG

2171 GTGACTGGGA AAACCCTGGC GTTACCCAAC TTAATCGCCT TGCAGCACAT
CCCCCTTTCG CCAGCTGGCG
CACTGACCCT TTTGGGACCG CAATGGGTTG AATTAGCGGA ACGTCGTGTA
GGGGGAAAGC GGTCGACCGC

2241 TAATAGCGAA GAGGCCCGCA CCGATCGCCC TTCCCAACAG TTGCGCAGCC
TGAATGGCGA ATGGGACGCG
ATTATCGCTT CTCCGGGCGT GGCTAGCGGG AAGGGTTGTC AACGCGTCGG
ACTTACCGCT TACCCTGCGC

2311 CCCTGTAGCG GCGCATTAAG CGCGGCGGGT GTGGTGGTTA CGCGCAGCGT
GACCGCTACA CTTGCCAGCG
GGGACATCGC CGCGTAATTC GCGCCGCCCA CACCACCAAT GCGCGTCGCA
CTGGCGATGT GAACGGTCGC

2381 CCCTAGCGCC CGCTCCTTTC GCTTTCTTCC CTTCCTTTCT CGCCACGTTC
GCCGGCTTTC CCCGTCAAGC
GGGATCGCGG GCGAGGAAAG CGAAAGAAGG GAAGGAAAGA GCGGTGCAAG
CGGCCGAAAG GGGCAGTTCG

Fig. 4C E

2451 TCTAAATCGG GGGCTCCCTT TAGGGTTCCG ATTTAGTGCT TTACGGCACC
TCGACCCCAA AAAACTTGAT
AGATTTAGCC CCCGAGGGAA ATCCCAAGGC TAAATCACGA AATGCCGTGG
AGCTGGGGTT TTTTGAACTA

2521 TAGGGTGATG GTTCACGTAG TGGGCCATCG CCCTGATAGA CGGTTTTTCG
CCCTTTGACG TTGGAGTCCA
ATCCCACTAC CAAGTGCATC ACCCGGTAGC GGGACTATCT GCCAAAAAGC
GGGAAACTGC AACCTCAGGT

2591 CGTTCTTTAA TAGTGGACTC TTGTTCCAAA CTGGAACAAC ACTCAACCCT
ATCTCGGTCT ATTCTTTTGA
GCAAGAAATT ATCACCTGAG AACAAGGTTT GACCTTGTTG TGAGTTGGGA
TAGAGCCAGA TAAGAAAACT

2661 TTTATAAGGG ATTTTGCCGA TTTCGGCCTA TTGGTTAAAA AATGAGCTGA
TTTAACAAAA ATTTAACGCG
AAATATTCCC TAAAACGGCT AAAGCCGGAT AACCAATTTT TTACTCGACT
AAATTGTTTT TAAATTGCGC

2731 AATTTTAACA AAATATTAAC GCTTACAATT TAGGTGGCAC TTTTCGGGGA
AATGTGCGCG GAACCCCTAT
TTAAAATTGT TTTATAATTG CGAATGTTAA ATCCACCGTG AAAAGCCCCT
TTACACGCGC CTTGGGGATA

2801 TTGTTTATTT TTCTAAATAC ATTCAAATAT GTATCCGCTC ATGAGACAAT
AACCCTGATA AATGCTTCAA
AACAAATAAA AAGATTTATG TAAGTTTATA CATAGGCGAG TACTCTGTTA
TTGGGACTAT TTACGAAGTT

2871 TAATATTGAA AAAGGAAGAG TATGAGTATT CAACATTTCC GTGTCGCCCT
TATTCCCTTT TTTGCGGCAT
ATTATAACTT TTTCCTTCTC ATACTCATAA GTTGTAAAGG CACAGCGGGA
ATAAGGGAAA AAACGCCGTA

2941 TTTGCCTTCC TGTTTTTGCT CACCCAGAAA CGCTGGTGAA AGTAAAAGAT
GCTGAAGATC AGTTGGGTGC
AAACGGAAGG ACAAAAACGA GTGGGTCTTT GCGACCACTT TCATTTTCTA
CGACTTCTAG TCAACCCACG

3011 ACGAGTGGGT TACATCGAAC TGGATCTCAA CAGCGGTAAG ATCCTTGAGA
GTTTTCGCCC CGAAGAACGT
TGCTCACCCA ATGTAGCTTG ACCTAGAGTT GTCGCCATTC TAGGAACTCT
CAAAAGCGGG GCTTCTTGCA

3081 TTTCCAATGA TGAGCACTTT TAAAGTTCTG CTATGTGGCG CGGTATTATC
CCGTATTGAC GCCGGGCAAG
AAAGGTTACT ACTCGTGAAA ATTTCAAGAC GATACACCGC GCCATAATAG
GGCATAACTG CGGCCCGTTC

3151 AGCAACTCGG TCGCCGCATA CACTATTCTC AGAATGACTT GGTTGAGTAC
TCACCAGTCA CAGAAAAGCA
TCGTTGAGCC AGCGGCGTAT GTGATAAGAG TCTTACTGAA CCAACTCATG
AGTGGTCAGT GTCTTTTCGT

Fig. 46F

3221 TCTTACGGAT GGCATGACAG TAAGAGAATT ATGCAGTGCT GCCATAACCA
TGAGTGATAA CACTGCGGCC
AGAATGCCTA CCGTACTGTC ATTCTCTTAA TACGTCACGA CGGTATTGGT
ACTCACTATT GTGACGCCGG

3291 AACTTACTTC TGACAACGAT CGGAGGACCG AAGGAGCTAA CCGCTTTTTT
GCACAACATG GGGGATCATG
TTGAATGAAG ACTGTTGCTA GCCTCCTGGC TTCCTCGATT GGCGAAAAAA
CGTGTTGTAC CCCCTAGTAC

3361 TAACTCGCCT TGATCGTTGG GAACCGGAGC TGAATGAAGC CATACCAAAC
GACGAGCGTG ACACCACGAT
ATTGAGCGGA ACTAGCAACC CTTGGCCTCG ACTTACTTCG GTATGGTTTG
CTGCTCGCAC TGTGGTGCTA

3431 GCCTGTAGCA ATGGCAACAA CGTTGCGCAA ACTATTAACT GGCGAACTAC
TTACTCTAGC TTCCCGGCAA
CGGACATCGT TACCGTTGTT GCAACGCGTT TGATAATTGA CCGCTTGATG
AATGAGATCG AAGGGCCGTT

3501 CAATTAATAG ACTGGATGGA GGCGGATAAA GTTGCAGGAC CACTTCTGCG
CTCGGCCCTT CCGGCTGGCT
GTTAATTATC TGACCTACCT CCGCCTATTT CAACGTCCTG GTGAAGACGC
GAGCCGGGAA GGCCGACCGA

3571 GGTTTATTGC TGATAAATCT GGAGCCGGTG AGCGTGGGTC TCGCGGTATC
ATTGCAGCAC TGGGGCCAGA
CCAAATAACG ACTATTTAGA CCTCGGCCAC TCGCACCCAG AGCGCCATAG
TAACGTCGTG ACCCCGGTCT

3641 TGGTAAGCCC TCCCGTATCG TAGTTATCTA CACGACGGGG AGTCAGGCAA
CTATGGATGA ACGAAATAGA
ACCATTCGGG AGGGCATAGC ATCAATAGAT GTGCTGCCCC TCAGTCCGTT
GATACCTACT TGCTTTATCT

3711 CAGATCGCTG AGATAGGTGC CTCACTGATT AAGCATTGGT AACTGTCAGA
CCAAGTTTAC TCATATATAC
GTCTAGCGAC TCTATCCACG GAGTGACTAA TTCGTAACCA TTGACAGTCT
GGTTCAAATG AGTATATATG

3781 TTTAGATTGA TTTAAAACTT CATTTTTAAT TTAAAAGGAT CTAGGTGAAG
ATCCTTTTTG ATAATCTCAT
AAATCTAACT AAATTTTGAA GTAAAAATTA AATTTTCCTA GATCCACTTC
TAGGAAAAAC TATTAGAGTA

3851 GACCAAAATC CCTTAACGTG AGTTTTCGTT CCACTGAGCG TCAGACCCCG
TAGAAAAGAT CAAAGGATCT
CTGGTTTTAG GGAATTGCAC TCAAAAGCAA GGTGACTCGC AGTCTGGGGC
ATCTTTTCTA GTTTCCTAGA

3921 TCTTGAGATC CTTTTTTTCT GCGCGTAATC TGCTGCTTGC AAACAAAAAA
ACCACCGCTA CCAGCGGTGG

Fig. 46 G

AGAACTCTAG GAAAAAAAGA CGCGCATTAG ACGACGAACG TTTGTTTTTT
TGGTGGCGAT GGTCGCCACC

3991 TTTGTTTGCC GGATCAAGAG CTACCAACTC TTTTTCCGAA GGTAACTGGC
TTCAGCAGAG CGCAGATACC
AAACAAACGG CCTAGTTCTC GATGGTTGAG AAAAAGGCTT CCATTGACCG
AAGTCGTCTC GCGTCTATGG

4061 AAATACTGTC CTTCTAGTGT AGCCGTAGTT AGGCCACCAC TTCAAGAACT
CTGTAGCACC GCCTACATAC
TTTATGACAG GAAGATCACA TCGGCATCAA TCCGGTGGTG AAGTTCTTGA
GACATCGTGG CGGATGTATG

4131 CTCGCTCTGC TAATCCTGTT ACCAGTGGCT GCTGCCAGTG GCGATAAGTC
GTGTCTTACC GGGTTGGACT
GAGCGAGACG ATTAGGACAA TGGTCACCGA CGACGGTCAC CGCTATTCAG
CACAGAATGG CCCAACCTGA

4201 CAAGACGATA GTTACCGGAT AAGGCGCAGC GGTCGGGCTG AACGGGGGGT
TCGTGCACAC AGCCCAGCTT
GTTCTGCTAT CAATGGCCTA TTCCGCGTCG CCAGCCCGAC TTGCCCCCCA
AGCACGTGTG TCGGGTCGAA

4271 GGAGCGAACG ACCTACACCG AACTGAGATA CCTACAGCGT GAGCTATGAG
AAAGCGCCAC GCTTCCCGAA
CCTCGCTTGC TGGATGTGGC TTGACTCTAT GGATGTCGCA CTCGATACTC
TTTCGCGGTG CGAAGGGCTT

4341 GGGAGAAAGG CGGACAGGTA TCCGGTAAGC GGCAGGGTCG GAACAGGAGA
GCGCACGAGG GAGCTTCCAG
CCCTCTTTCC GCCTGTCCAT AGGCCATTCG CCGTCCCAGC CTTGTCCTCT
CGCGTGCTCC CTCGAAGGTC

4411 GGGGAAACGC CTGGTATCTT TATAGTCCTG TCGGGTTTCG CCACCTCTGA
CTTGAGCGTC GATTTTTGTG
CCCCTTTGCG GACCATAGAA ATATCAGGAC AGCCCAAAGC GGTGGAGACT
GAACTCGCAG CTAAAAACAC

4481 ATGCTCGTCA GGGGGGCGGA GCCTATGGAA AAACGCCAGC AACGCGGCCT
TTTTACGGTT CCTGGCCTTT
TACGAGCAGT CCCCCCGCCT CGGATACCTT TTTGCGGTCG TTGCGCCGGA
AAAATGCCAA GGACCGGAAA

4551 TGCTGGCCTT TTGCTCACAT GTTCTTTCCT GCGTTATCCC CTGATTCTGT
GGATAACCGT ATTACCGCCT
ACGACCGGAA AACGAGTGTA CAAGAAAGGA CGCAATAGGG GACTAAGACA
CCTATTGGCA TAATGGCGGA

4621 TTGAGTGAGC TGATACCGCT CGCCGCAGCC GAACGACCGA GCGCAGCGAG
TCAGTGAGCG AGGAAGCGGA
AACTCACTCG ACTATGGCGA GCGGCGTCGG CTTGCTGGCT CGCGTCGCTC
AGTCACTCGC TCCTTCGCCT

Fig. 46 H

4691 AGAGCGCCCA ATACGCAAAC CGCCTCTCCC CGCGCGTTGG CCGATTCATT
AATGCAGCTG GCACGACAGG
TCTCGCGGGT TATGCGTTTG GCGGAGAGGG GCGCGCAACC GGCTAAGTAA
TTACGTCGAC CGTGCTGTCC

4761 TTTCCCGACT GGAAAGCGGG CAGTGAGCGC AACGCAATTA ATGTGAGTTA
GCTCACTCAT TAGGCACCCC
AAAGGGCTGA CCTTTCGCCC GTCACTCGCG TTGCGTTAAT TACACTCAAT
CGAGTGAGTA ATCCGTGGGG

4831 AGGCTTTACA CTTTATGCTT CCGGCTCGTA TGTTGTGTGG AATTGTGAGC
GGATAACAAT TTCACACAGG
TCCGAAATGT GAAATACGAA GGCCGAGCAT ACAACACACC TTAACACTCG
CCTATTGTTA AAGTGTGTCC

BssHII

EcoRI

~~~~~~~

4901 AAACAGCTAT GACCATGATT ACGCCAAGCG CGCAATTAAC CCTCACTAAA
GGGAACAAAA GCTGG
TTTGTCGATA CTGGTACTAA TGCGGTTCGC GCGTTAATTG GGAGTGATTT
CCCTTGTTTT CGACC

Fig. 4C I
~~~~~~~

Figure 42A

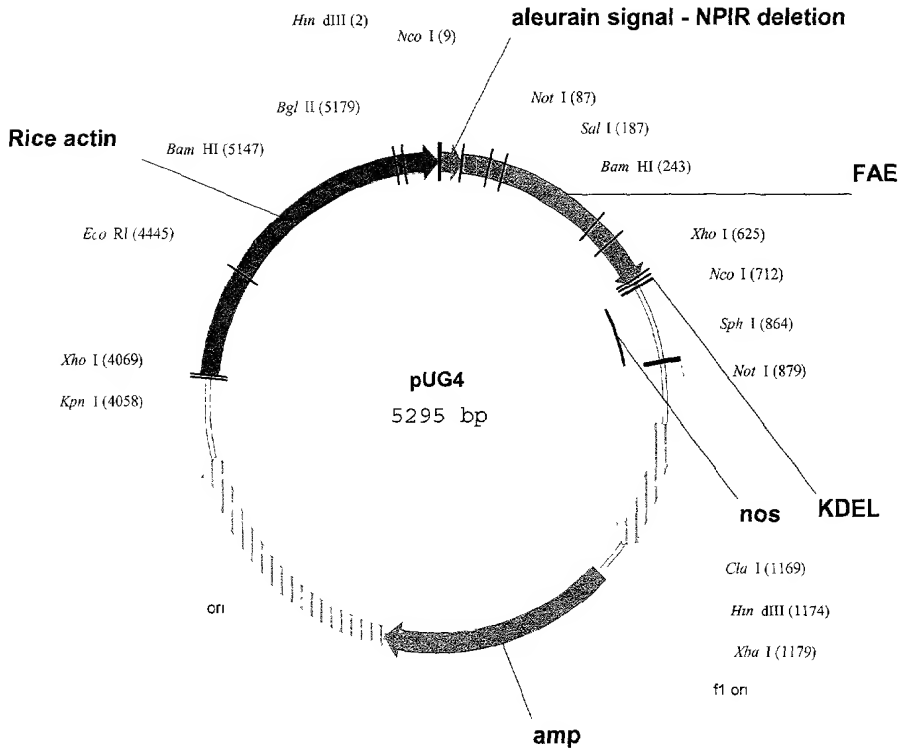

Figure 47B

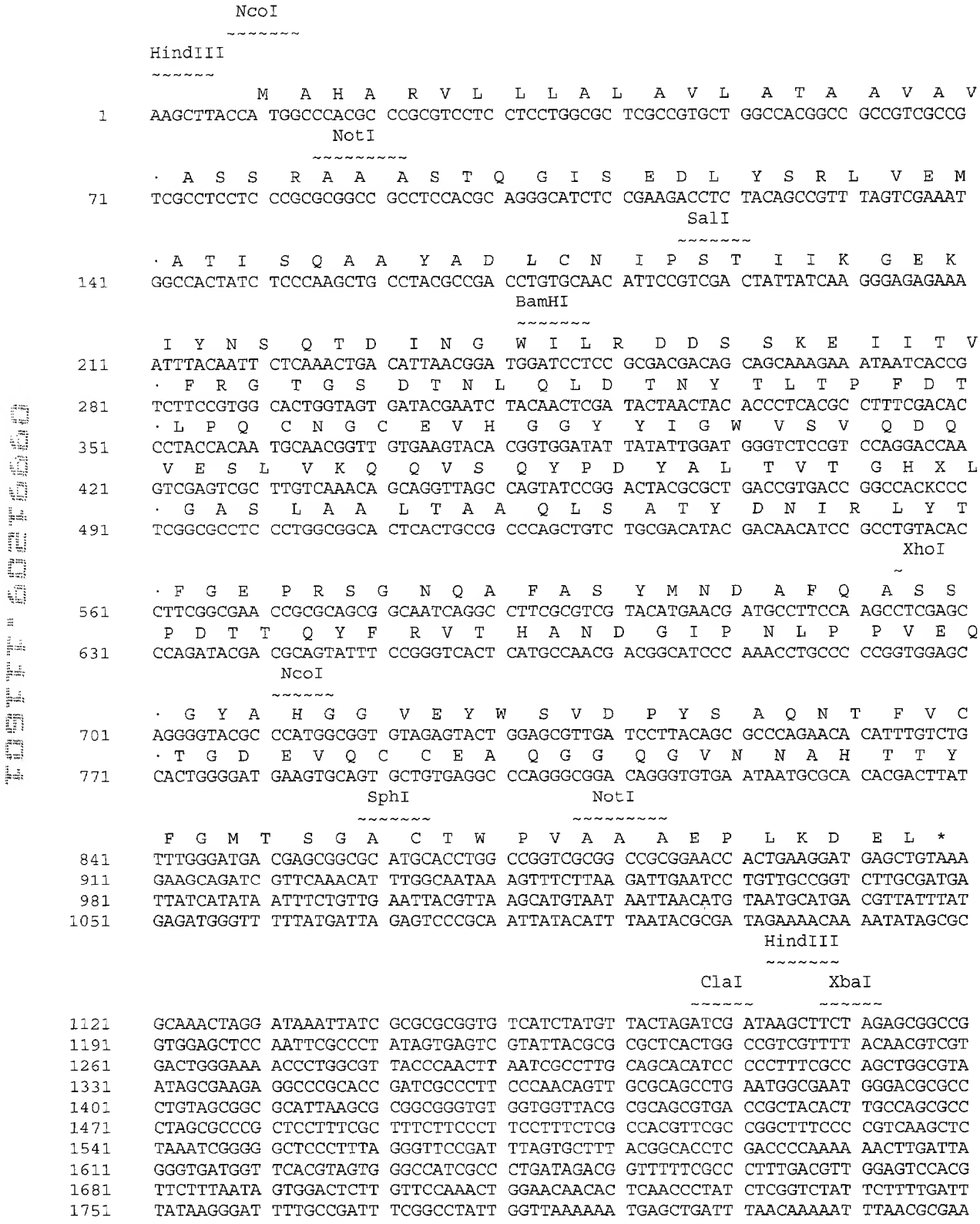

Fig. 47C

```
1821    TTTTAACAAA ATATTAACGC TTACAATTTA GGTGGCACTT TTCGGGGAAA TGTGCGCGGA ACCCCTATTT
1891    GTTTATTTTT CTAAATACAT TCAAATATGT ATCCGCTCAT GAGACAATAA CCCTGATAAA TGCTTCAATA
1961    ATATTGAAAA AGGAAGAGTA TGAGTATTCA ACATTTCCGT GTCGCCCTTA TTCCCTTTTT TGCGGCATTT
2031    TGCCTTCCTG TTTTTGCTCA CCCAGAAACG CTGGTGAAAG TAAAAGATGC TGAAGATCAG TTGGGTGCAC
2101    GAGTGGGTTA CATCGAACTG GATCTCAACA GCGGTAAGAT CCTTGAGAGT TTTCGCCCCG AAGAACGTTT
2171    TCCAATGATG AGCACTTTTA AAGTTCTGCT ATGTGGCGCG GTATTATCCC GTATTGACGC CGGGCAAGAG
2241    CAACTCGGTC GCCGCATACA CTATTCTCAG AATGACTTGG TTGAGTACTC ACCAGTCACA GAAAAGCATC
2311    TTACGGATGG CATGACAGTA AGAGAATTAT GCAGTGCTGC CATAACCATG AGTGATAACA CTGCGGCCAA
2381    CTTACTTCTG ACAACGATCG GAGGACCGAA GGAGCTAACC GCTTTTTTGC ACAACATGGG GGATCATGTA
2451    ACTCGCCTTG ATCGTTGGGA ACCGGAGCTG AATGAAGCCA TACCAAACGA CGAGCGTGAC ACCACGATGC
2521    CTGTAGCAAT GGCAACAACG TTGCGCAAAC TATTAACTGG CGAACTACTT ACTCTAGCTT CCCGGCAACA
2591    ATTAATAGAC TGGATGGAGG CGGATAAAGT TGCAGGACCA CTTCTGCGCT CGGCCCTTCC GGCTGGCTGG
2661    TTTATTGCTG ATAAATCTGG AGCCGGTGAG CGTGGGTCTC GCGGTATCAT TGCAGCACTG GGGCCAGATG
2731    GTAAGCCCTC CCGTATCGTA GTTATCTACA CGACGGGGAG TCAGGCAACT ATGGATGAAC GAAATAGACA
2801    GATCGCTGAG ATAGGTGCCT CACTGATTAA GCATTGGTAA CTGTCAGACC AAGTTTACTC ATATATACTT
2871    TAGATTGATT TAAAACTTCA TTTTTAATTT AAAAGGATCT AGGTGAAGAT CCTTTTTGAT AATCTCATGA
2941    CCAAAATCCC TTAACGTGAG TTTTCGTTCC ACTGAGCGTC AGACCCCGTA GAAAAGATCA AAGGATCTTC
3011    TTGAGATCCT TTTTTTCTGC GCGTAATCTG CTGCTTGCAA ACAAAAAAAC CACCGCTACC AGCGGTGGTT
3081    TGTTTGCCGG ATCAAGAGCT ACCAACTCTT TTTCCGAAGG TAACTGGCTT CAGCAGAGCG CAGATACCAA
3151    ATACTGTCCT TCTAGTGTAG CCGTAGTTAG GCCACCACTT CAAGAACTCT GTAGCACCGC CTACATACCT
3221    CGCTCTGCTA ATCCTGTTAC CAGTGGCTGC TGCCAGTGGC GATAAGTCGT GTCTTACCGG GTTGGACTCA
3291    AGACGATAGT TACCGGATAA GGCGCAGCGG TCGGGCTGAA CGGGGGGTTC GTGCACACAG CCCAGCTTGG
3361    AGCGAACGAC CTACACCGAA CTGAGATACC TACAGCGTGA GCTATGAGAA AGCGCCACGC TTCCCGAAGG
3431    GAGAAAGGCG GACAGGTATC CGGTAAGCGG CAGGGTCGGA ACAGGAGAGC GCACGAGGGA GCTTCCAGGG
3501    GGAAACGCCT GGTATCTTTA TAGTCCTGTC GGGTTTCGCC ACCTCTGACT TGAGCGTCGA TTTTTGTGAT
3571    GCTCGTCAGG GGGGCGGAGC CTATGGAAAA ACGCCAGCAA CGCGGCCTTT TTACGGTTCC TGGCCTTTTG
3641    CTGGCCTTTT GCTCACATGT TCTTTCCTGC GTTATCCCCT GATTCTGTGG ATAACCGTAT TACCGCCTTT
3711    GAGTGAGCTG ATACCGCTCG CCGCAGCCGA ACGACCGAGC GCAGCGAGTC AGTGAGCGAG GAAGCGGAAG
3781    AGCGCCCAAT ACGCAAACCG CCTCTCCCCG CGCGTTGGCC GATTCATTAA TGCAGCTGGC ACGACAGGTT
3851    TCCCGACTGG AAAGCGGGCA GTGAGCGCAA CGCAATTAAT GTGAGTTAGC TCACTCATTA GGCACCCCAG
3921    GCTTTACACT TTATGCTTCC GGCTCGTATG TTGTGTGGAA TTGTGAGCGG ATAACAATTT CACACAGGAA
                                                                          KpnI
                                                                          ~~
3991    ACAGCTATGA CCATGATTAC GCCAAGCGCG CAATTAACCC TCACTAAAGG GAACAAAAGC TGGGTACCGG
              XhoI
              ~~~~~~~
4061    GCCCCCCCTC GAGGTCATTC ATATGCTTGA GAAGAGAGTC GGGATAGTCC AAAATAAAAC AAAGGTAAGA
4131    TTACCTGGTC AAAAGTGAAA ACATCAGTTA AAAGGTGGTA TAAGTAAAAT ATCGGTAATA AAAGGTGGCC
4201    CAAAGTGAAA TTTACTCTTT TCTACTATTA TAAAAATTGA GGATGTTTTG TCGGTACTTT GATACGTCAT
4271    TTTTGTATGA ATTGGTTTTT AAGTTTATTC GCGATTTGGA AATGCATATC TGTATTTGAG TCGGTTTTTA
4341    AGTTCGTTGC TTTTGTAAAT ACAGAGGGAT TTGTATAAGA AATATCTTTA AAAAACCCAT ATGCTAATTT
                                        EcoRI
                                        ~~~~~~~
4411    GACATAATTT TTGAGAAAAA TATATATTCA GGCGAATTCC ACAATGAACA ATAATAAGAT TAAAATAGCT
4481    TGCCCCCGTT GCAGCGATGG GTATTTTTTC TAGTAAAATA AAAGATAAAC TTAGACTCAA AACATTTACA
4551    AAAACAACCC CTAAAGTCCT AAAGCCCAAA GTGCTATGCA CGATCCATAG CAAGCCCAGC CCAACCCAAC
4621    CCAACCCAAC CCACCCCAGT GCAGCCAACT GGCAAATAGT CTCCACCCCC GGCACTATCA CCGTGAGTTG
4691    TCCGCACCAC CGCACGTCTC GCAGCCAAAA AAAAAAAAAG AAAGAAAAAA AAGAAAAAGA AAAACAGCAG
4761    GTGGGTCCGG GTCGTGGGGG CCGGAAAAGC GAGGAGGATC GCGAGCAGCG ACGAGGCCCG GCCCTCCCTC
4831    CGCTTCCAAA GAAACGCCCC CCATCGCCAC TATATACATA CCCCCCCCTC TCCTCCCATC CCCCCAACCC
4901    TACCACCACC ACCACCACCA CCTCCTCCCC CCTCGCTGCC GGACGACGAG CTCCTCCCCC CTCCCCCTCC
4971    GCCGCCGCCG GTAACCACCC CGCCCCTCTC CTCTTTCTTT CTCCGTTTTT TTTTTCGTCT CGGTCTCGAT
5041    CTTTGGCCTT GGTAGTTTGG GTGGGCGAGA GCGGCTTCGT CGCCCAGATC GGTGCGCGGG AGGGGCGGGA
                                        BamHI                                 BglII
                                        ~~~~~~~
5111    TCTCGCGGCT GGCGTCTCCG GGCGTGAGTC GGCCCGGATC CTCGCGGGGA ATGGGGCTCT CGGATGTAGA
        BglII
        ~~~
5181    TCTTCTTTCT TTCTTCTTTT TGTGGTAGAA TTTGAATCCC TCAGCATTGT TCATCGGTAG TTTTTCTTTT
5251    CATGATTTGT GACAAATGCA GCCTCGTGCG GAGCTTTTTT GTAGC
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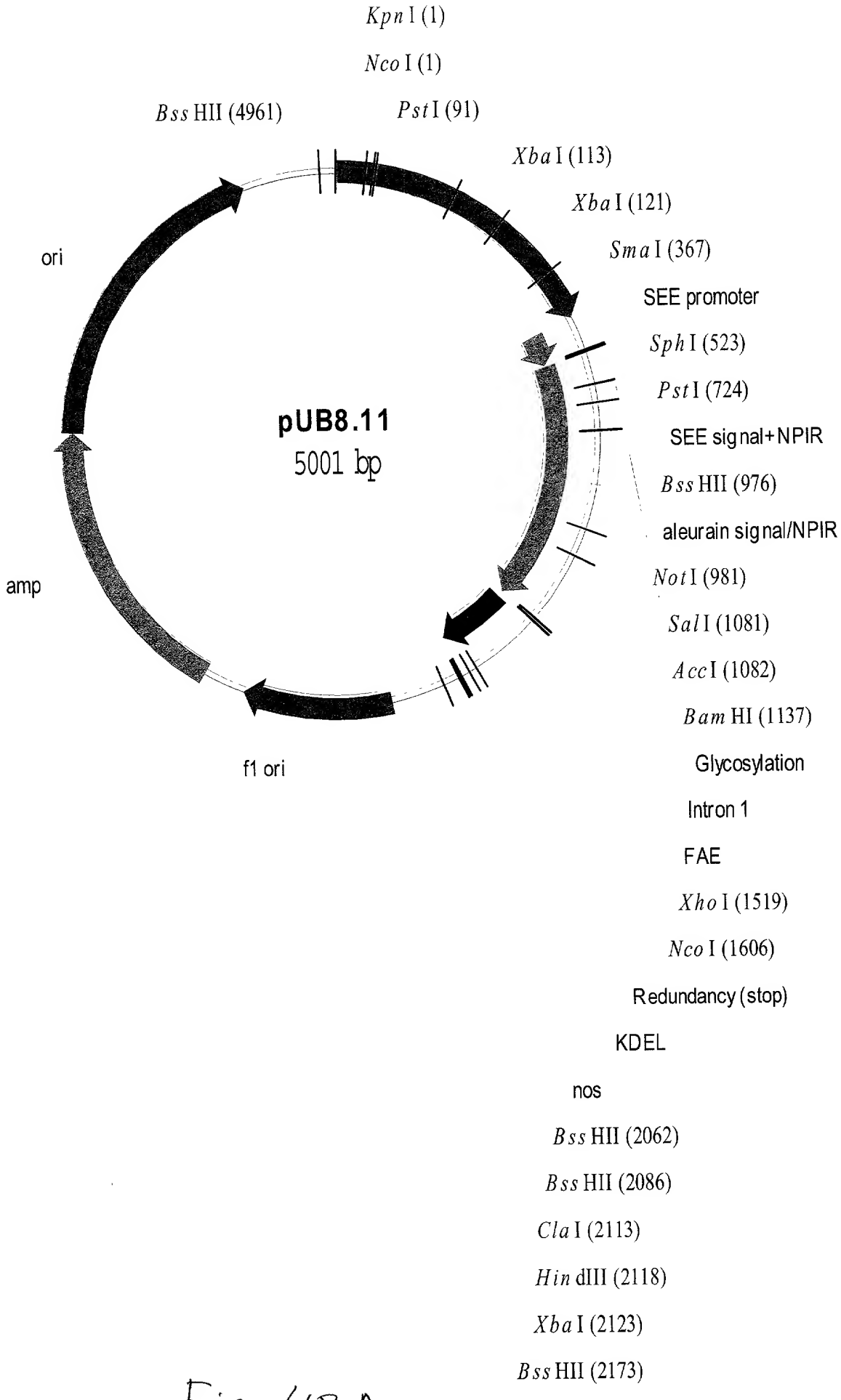

Kpn I (1)
Nco I (1)
Bss HII (4961)
Pst I (91)
Xba I (113)
Xba I (121)
Sma I (367)
SEE promoter
Sph I (523)
Pst I (724)
SEE signal+NPIR
Bss HII (976)
aleurain signal/NPIR
Not I (981)
Sal I (1081)
Acc I (1082)
Bam HI (1137)
Glycosylation
Intron 1
FAE
Xho I (1519)
Nco I (1606)
Redundancy (stop)
KDEL
nos
Bss HII (2062)
Bss HII (2086)
Cla I (2113)
Hin dIII (2118)
Xba I (2123)
Bss HII (2173)
ori
amp
f1 ori
pUB8.11
5001 bp

Fig. 48A

Sequence for pUB8.11

```
          NcoI
          ~~~~~
          KpnI
          ~
       1  CATGGGCCAG GTATAATTAT GGGATATCTC AAGCAAATAA TCGAAATATC
ACCATTGGCT ACAATATCTG
          GTACCCGGTC CATATTAATA CCCTATAGAG TTCGTTTATT AGCTTTATAG
TGGTAACCGA TGTTATAGAC

                            PstI                                XbaI     XbaI
                           ~~~~~~~                             ~~~~~~  ~~~~~~~
      71  AGCTCCGAGT TCTGACTGCA GTCTGGATGA CGCGTGTTGT ATCTAGAACT
CTAGATAGCA CAGCCACAGC
          TCGAGGCTCA AGACTGACGT CAGACCTACT GCGCACAACA TAGATCTTGA
GATCTATCGT GTCGGTGTCG

     141  ACCTACAGGA GTGCGACACT TGTGGACTGT AGTAGTGTTG GAGACGGAGC
TCTTTCCTAC CTCCTGACGT
          TGGATGTCCT CACGCTGTGA ACACCTGACA TCATCACAAC CTCTGCCTCG
AGAAAGGATG GAGGACTGCA

     211  TGCCGCCGTT GTCCATTCCA ACGGCATCAC TCTCAACCAA TCACGCGCTC
CCAACAAAAT ATCGTCCCCC
          ACGGCGGCAA CAGGTAAGGT TGCCGTAGTG AGAGTTGGTT AGTGCGCGAG
GGTTGTTTTA TAGCAGGGGG

     281  ATGTCTTGGC GGAGAGAGAG TACATACATG CTGTCGCGCC GTTTTTGTCT
GAATCTCGCT TCCACTGGCC
          TACAGAACCG CCTCTCTCTC ATGTATGTAC GACAGCGCGG CAAAAACAGA
CTTAGAGCGA AGGTGACCGG

                          SmaI
                         ~~~~~~
     351  AATCAGCTCA GCTCCCGGGA GCTCACTCAT TCAAGATCCC ATCGTCGTCG
TCACCCCTGG CGTCATGGGA
          TTAGTCGAGT CGAGGGCCCT CGAGTGAGTA AGTTCTAGGG TAGCAGCAGC
AGTGGGGACC GCAGTACCCT

     421  TGGAAAAGAA CCTCCGTTGC TCGGATGAGT CAGCCATATC CCCGAACAGA
GTACTGCAAG ATAACCCAAT
          ACCTTTTCTT GGAGGCAACG AGCCTACTCA GTCGGTATAG GGGCTTGTCT
CATGACGTTC TATTGGGTTA

                                        SphI
                                       ~~~~~~~
     491  TCAGATTCCC CCAATAGAGA AAGTATAGCA TGCTTTCGGG TTTTGTTTGG
CTTAATTGAC TTTATTTTTG
          AGTCTAAGGG GGTTATCTCT TTCATATCGT ACGAAAGCCC AAAACAAACC
GAATTAACTG AAATAAAAAC
```

Fig. 48B

561 TTGGAGTTGA ATGCTGATTT GTTGTGTAAA ATGCCCAACC ATCTGAATAT
CGAGACGGAT AATAGGCTGG
AACCTCAACT TACGACTAAA CAACACATTT TACGGGTTGG TAGACTTATA
GCTCTGCCTA TTATCCGACC

631 CTAATTAATT TATAGCAAGA TTCTGTAGTG CACATCGCAA ATATCTTTCT
GGGCATTACA GCTGGAGGCT
GATTAATTAA ATATCGTTCT AAGACATCAC GTGTAGCGTT TATAGAAAGA
CCCGTAATGT CGACCTCCGA

PstI
~~~~~~~

701 TCATCAGCCT GAAACACTCT GCAGAGCCTG AAGCAAGTGG TGAAGCGTGG
CGATGAGATG GGTATAAAAC
AGTAGTCGGA CTTTGTGAGA CGTCTCGGAC TTCGTTCACC ACTTCGCACC
GCTACTCTAC CCATATTTTG

771 CCCCGGCACC GGGACGCGAG CTCCCGCCTA CCAGTACCAT CTCGCCTCGC
TCCCCCTGCC GGACGACCCA
GGGGCCGTGG CCCTGCGCTC GAGGGCGGAT GGTCATGGTA GAGCGGAGCG
AGGGGGACGG CCTGCTGGGT

841 GTAAAATACT GTTGCCCACT CGCCGGCGAG ATGGCCCACG GCCGCATCCT
CTTCTTGGCG CTCGCCGTCT
CATTTTATGA CAACGGGTGA GCGGCCGCTC TACCGGGTGC CGGCGTAGGA
GAAGAACCGC GAGCGGCAGA

BssHII

~~~~~~

NotI

~~
911 TGGCCACCGC CGCGGTGGCC GCCGCATCNT TGGCGGACTC CAACCCGATC
CGGCCCGTCA CCGAGCGCGC
ACCGGTGGCG GCGCCACCGG CGGCGTAGNA ACCGCCTGAG GTTGGGCTAG
GCCGGGCAGT GGCTCGCGCG

NotI
~~~~~~
981 GGCCGCCTCC ACGCAGGGCA TCTCCGAAGA CCTCTACAGC CGTTTAGTCG
AAATGGCCAC TATCTCCCAA
CCGGCGGAGG TGCGTCCCGT AGAGGCTTCT GGAGATGTCG GCAAATCAGC
TTTACCGGTG ATAGAGGGTT

SalI
~~~~~~~
AccI
~~~~~~~
1051 GCTGCCTACG CCGACCTGTG CAACATTCCG TCGACTATTA TCAAGGGAGA
GAAAATTTAC AATTCTCAAA

Fig. 48 C
~~~~~~~

CGACGGATGC GGCTGGACAC GTTGTAAGGC AGCTGATAAT AGTTCCCTCT
CTTTTAAATG TTAAGAGTTT

BamHI
~~~~~~~

1121 CTGACATTAA CGGATGGATC CTCCGCGACG ACAGCAGCAA AGAAATAATC
ACCGTCTTCC GTGGCACTGG
GACTGTAATT GCCTACCTAG GAGGCGCTGC TGTCGTCGTT TCTTTATTAG
TGGCAGAAGG CACCGTGACC

1191 TAGTGATACG AATCTACAAC TCGATACTAA CTACACCCTC ACGCCTTTCG
ACACCCTACC ACAATGCAAC
ATCACTATGC TTAGATGTTG AGCTATGATT GATGTGGGAG TGCGGAAAGC
TGTGGGATGG TGTTACGTTG

1261 GGTTGTGAAG TACACGGTGG ATATTATATT GGATGGGTCT CCGTCCAGGA
CCAAGTCGAG TCGCTTGTCA
CCAACACTTC ATGTGCCACC TATAATATAA CCTACCCAGA GGCAGGTCCT
GGTTCAGCTC AGCGAACAGT

1331 AACAGCAGGT TAGCCAGTAT CCGGACTACG CGCTGACCGT GACCGGCCAC
KCCCTCGGCG CCTCCCTGGC
TTGTCGTCCA ATCGGTCATA GGCCTGATGC GCGACTGGCA CTGGCCGGTG
MGGGAGCCGC GGAGGGACCG

1401 GGCACTCACT GCCGCCCAGC TGTCTGCGAC ATACGACAAC ATCCGCCTGT
ACACCTTCGG CGAACCGCGC
CCGTGAGTGA CGGCGGGTCG ACAGACGCTG TATGCTGTTG TAGGCGGACA
TGTGGAAGCC GCTTGGCGCG

XhoI
~~~~~~~

1471 AGCGGCAATC AGGCCTTCGC GTCGTACATG AACGATGCCT TCCAAGCCTC
GAGCCCAGAT ACGACGCAGT
TCGCCGTTAG TCCGGAAGCG CAGCATGTAC TTGCTACGGA AGGTTCGGAG
CTCGGGTCTA TGCTGCGTCA

NcoI

~~~~~~

1541 ATTTCCGGGT CACTCATGCC AACGACGGCA TCCCAAACCT GCCCCCGGTG
GAGCAGGGGT ACGCCCATGG
TAAAGGCCCA GTGAGTACGG TTGCTGCCGT AGGGTTTGGA CGGGGGCCAC
CTCGTCCCCA TGCGGGTACC

1611 CGGTGTAGAG TACTGGAGCG TTGATCCTTA CAGCGCCCAG AACACATTTG
TCTGCACTGG GGATGAAGTG
GCCACATCTC ATGACCTCGC AACTAGGAAT GTCGCGGGTC TTGTGTAAAC
AGACGTGACC CCTACTTCAC

1681 CAGTGCTGTG AGGCCCAGGG CGGACAGGGT GTGAATAATG CGCACACGAC
TTATTTTGGG ATGACGAGCG

Fig. 48D
~~~~~~

GTCACGACAC TCCGGGTCCC GCCTGTCCCA CACTTATTAC GCGTGTGCTG
AATAAAACCC TACTGCTCGC

1751 GAGCCTGTAC ATGGTGATCA GTCATTTCAG CCTCCCCGAG TGTACCAGGA
AAGATGGATG TCCTGGAGAG
CTCGGACATG TACCACTAGT CAGTAAAGTC GGAGGGGCTC ACATGGTCCT
TTCTACCTAC AGGACCTCTC

1821 GGGGCCGCGT AACCACTGAA GGATGAGCTG TAAAGAAGCA GATCGTTCAA
ACATTTGGCA ATAAAGTTTC
CCCCGGCGCA TTGGTGACTT CCTACTCGAC ATTTCTTCGT CTAGCAAGTT
TGTAAACCGT TATTTCAAAG

1891 TTAAGATTGA ATCCTGTTGC CGGTCTTGCG ATGATTATCA TATAATTTCT
GTTGAATTAC GTTAAGCATG
AATTCTAACT TAGGACAACG GCCAGAACGC TACTAATAGT ATATTAAAGA
CAACTTAATG CAATTCGTAC

1961 TAATAATTAA CATGTAATGC ATGACGTTAT TTATGAGATG GGTTTTTATG
ATTAGAGTCC CGCAATTATA
ATTATTAATT GTACATTACG TACTGCAATA AATACTCTAC CCAAAAATAC
TAATCTCAGG GCGTTAATAT

BssHII
~~~~~~
BssHII
~~~~~~
2031 CATTTAATAC GCGATAGAAA ACAAAATATA GCGCGCAAAC TAGGATAAAT
TATCGCGCGC GGTGTCATCT
GTAAATTATG CGCTATCTTT TGTTTTATAT CGCGCGTTTG ATCCTATTTA
ATAGCGCGCG CCACAGTAGA

XbaI
~~~~~~
ClaI HindIII
~~~~~~~~~~~~~~
2101 ATGTTACTAG ATCGATAAGC TTCTAGAGCG GCCGGTGGAG CTCCAATTCG
CCCTATAGTG AGTCGTATTA
TACAATGATC TAGCTATTCG AAGATCTCGC CGGCCACCTC GAGGTTAAGC
GGGATATCAC TCAGCATAAT

BssHII
~~~~~~
2171 CGCGCGCTCA CTGGCCGTCG TTTTACAACG TCGTGACTGG GAAAACCCTG
GCGTTACCCA ACTTAATCGC
GCGCGCGAGT GACCGGCAGC AAAATGTTGC AGCACTGACC CTTTTGGGAC
CGCAATGGGT TGAATTAGCG

2241 CTTGCAGCAC ATCCCCCTTT CGCCAGCTGG CGTAATAGCG AAGAGGCCCG
CACCGATCGC CCTTCCCAAC
GAACGTCGTG TAGGGGGAAA GCGGTCGACC GCATTATCGC TTCTCCGGGC
GTGGCTAGCG GGAAGGGTTG

Fig. 48 E
~~~~~~

2311 AGTTGCGCAG CCTGAATGGC GAATGGGACG CGCCCTGTAG CGGCGCATTA
AGCGCGGCGG GTGTGGTGGT
TCAACGCGTC GGACTTACCG CTTACCCTGC GCGGGACATC GCCGCGTAAT
TCGCGCCGCC CACACCACCA

2381 TACGCGCAGC GTGACCGCTA CACTTGCCAG CGCCCTAGCG CCCGCTCCTT
TCGCTTTCTT CCCTTCCTTT
ATGCGCGTCG CACTGGCGAT GTGAACGGTC GCGGGATCGC GGGCGAGGAA
AGCGAAAGAA GGGAAGGAAA

2451 CTCGCCACGT TCGCCGGCTT TCCCCGTCAA GCTCTAAATC GGGGGCTCCC
TTTAGGGTTC CGATTTAGTG
GAGCGGTGCA AGCGGCCGAA AGGGGCAGTT CGAGATTTAG CCCCCGAGGG
AAATCCCAAG GCTAAATCAC

2521 CTTTACGGCA CCTCGACCCC AAAAAACTTG ATTAGGGTGA TGGTTCACGT
AGTGGGCCAT CGCCCTGATA
GAAATGCCGT GGAGCTGGGG TTTTTTGAAC TAATCCCACT ACCAAGTGCA
TCACCCGGTA GCGGGACTAT

2591 GACGGTTTTT CGCCCTTTGA CGTTGGAGTC CACGTTCTTT AATAGTGGAC
TCTTGTTCCA AACTGGAACA
CTGCCAAAAA GCGGGAAACT GCAACCTCAG GTGCAAGAAA TTATCACCTG
AGAACAAGGT TTGACCTTGT

2661 ACACTCAACC CTATCTCGGT CTATTCTTTT GATTTATAAG GGATTTTGCC
GATTTCGGCC TATTGGTTAA
TGTGAGTTGG GATAGAGCCA GATAAGAAAA CTAAATATTC CCTAAAACGG
CTAAAGCCGG ATAACCAATT

2731 AAAATGAGCT GATTTAACAA AAATTTAACG CGAATTTTAA CAAAATATTA
ACGCTTACAA TTTAGGTGGC
TTTTACTCGA CTAAATTGTT TTTAAATTGC GCTTAAAATT GTTTTATAAT
TGCGAATGTT AAATCCACCG

2801 ACTTTTCGGG GAAATGTGCG CGGAACCCCT ATTTGTTTAT TTTTCTAAAT
ACATTCAAAT ATGTATCCGC
TGAAAAGCCC CTTTACACGC GCCTTGGGGA TAAACAAATA AAAAGATTTA
TGTAAGTTTA TACATAGGCG

2871 TCATGAGACA ATAACCCTGA TAAATGCTTC AATAATATTG AAAAAGGAAG
AGTATGAGTA TTCAACATTT
AGTACTCTGT TATTGGGACT ATTTACGAAG TTATTATAAC TTTTTCCTTC
TCATACTCAT AAGTTGTAAA

2941 CCGTGTCGCC CTTATTCCCT TTTTTGCGGC ATTTTGCCTT CCTGTTTTTG
CTCACCCAGA AACGCTGGTG
GGCACAGCGG GAATAAGGGA AAAAACGCCG TAAAACGGAA GGACAAAAAC
GAGTGGGTCT TTGCGACCAC

3011 AAAGTAAAAG ATGCTGAAGA TCAGTTGGGT GCACGAGTGG GTTACATCGA
ACTGGATCTC AACAGCGGTA
TTTCATTTTC TACGACTTCT AGTCAACCCA CGTGCTCACC CAATGTAGCT
TGACCTAGAG TTGTCGCCAT

Fig. 48 F

3081 AGATCCTTGA GAGTTTTCGC CCCGAAGAAC GTTTTCCAAT GATGAGCACT
TTTAAAGTTC TGCTATGTGG
TCTAGGAACT CTCAAAAGCG GGGCTTCTTG CAAAAGGTTA CTACTCGTGA
AAATTTCAAG ACGATACACC

3151 CGCGGTATTA TCCCGTATTG ACGCCGGGCA AGAGCAACTC GGTCGCCGCA
TACACTATTC TCAGAATGAC
GCGCCATAAT AGGGCATAAC TGCGGCCCGT TCTCGTTGAG CCAGCGGCGT
ATGTGATAAG AGTCTTACTG

3221 TTGGTTGAGT ACTCACCAGT CACAGAAAAG CATCTTACGG ATGGCATGAC
AGTAAGAGAA TTATGCAGTG
AACCAACTCA TGAGTGGTCA GTGTCTTTTC GTAGAATGCC TACCGTACTG
TCATTCTCTT AATACGTCAC

3291 CTGCCATAAC CATGAGTGAT AACACTGCGG CCAACTTACT TCTGACAACG
ATCGGAGGAC CGAAGGAGCT
GACGGTATTG GTACTCACTA TTGTGACGCC GGTTGAATGA AGACTGTTGC
TAGCCTCCTG GCTTCCTCGA

3361 AACCGCTTTT TTGCACAACA TGGGGGATCA TGTAACTCGC CTTGATCGTT
GGGAACCGGA GCTGAATGAA
TTGGCGAAAA AACGTGTTGT ACCCCCTAGT ACATTGAGCG GAACTAGCAA
CCCTTGGCCT CGACTTACTT

3431 GCCATACCAA ACGACGAGCG TGACACCACG ATGCCTGTAG CAATGGCAAC
AACGTTGCGC AAACTATTAA
CGGTATGGTT TGCTGCTCGC ACTGTGGTGC TACGGACATC GTTACCGTTG
TTGCAACGCG TTTGATAATT

3501 CTGGCGAACT ACTTACTCTA GCTTCCCGGC AACAATTAAT AGACTGGATG
GAGGCGGATA AAGTTGCAGG
GACCGCTTGA TGAATGAGAT CGAAGGGCCG TTGTTAATTA TCTGACCTAC
CTCCGCCTAT TTCAACGTCC

3571 ACCACTTCTG CGCTCGGCCC TTCCGGCTGG CTGGTTTATT GCTGATAAAT
CTGGAGCCGG TGAGCGTGGG
TGGTGAAGAC GCGAGCCGGG AAGGCCGACC GACCAAATAA CGACTATTTA
GACCTCGGCC ACTCGCACCC

3641 TCTCGCGGTA TCATTGCAGC ACTGGGGCCA GATGGTAAGC CCTCCCGTAT
CGTAGTTATC TACACGACGG
AGAGCGCCAT AGTAACGTCG TGACCCCGGT CTACCATTCG GGAGGGCATA
GCATCAATAG ATGTGCTGCC

3711 GGAGTCAGGC AACTATGGAT GAACGAAATA GACAGATCGC TGAGATAGGT
GCCTCACTGA TTAAGCATTG
CCTCAGTCCG TTGATACCTA CTTGCTTTAT CTGTCTAGCG ACTCTATCCA
CGGAGTGACT AATTCGTAAC

3781 GTAACTGTCA GACCAAGTTT ACTCATATAT ACTTTAGATT GATTTAAAAC
TTCATTTTTA ATTTAAAAGG

Fig. 48 G

CATTGACAGT CTGGTTCAAA TGAGTATATA TGAAATCTAA CTAAATTTTG
AAGTAAAAAT TAAATTTTCC

3851 ATCTAGGTGA AGATCCTTTT TGATAATCTC ATGACCAAAA TCCCTTAACG
TGAGTTTTCG TTCCACTGAG
TAGATCCACT TCTAGGAAAA ACTATTAGAG TACTGGTTTT AGGGAATTGC
ACTCAAAAGC AAGGTGACTC

3921 CGTCAGACCC CGTAGAAAAG ATCAAAGGAT CTTCTTGAGA TCCTTTTTTT
CTGCGCGTAA TCTGCTGCTT
GCAGTCTGGG GCATCTTTTC TAGTTTCCTA GAAGAACTCT AGGAAAAAAA
GACGCGCATT AGACGACGAA

3991 GCAAACAAAA AAACCACCGC TACCAGCGGT GGTTTGTTTG CCGGATCAAG
AGCTACCAAC TCTTTTTCCG
CGTTTGTTTT TTTGGTGGCG ATGGTCGCCA CCAAACAAAC GGCCTAGTTC
TCGATGGTTG AGAAAAAGGC

4061 AAGGTAACTG GCTTCAGCAG AGCGCAGATA CCAAATACTG TCCTTCTAGT
GTAGCCGTAG TTAGGCCACC
TTCCATTGAC CGAAGTCGTC TCGCGTCTAT GGTTTATGAC AGGAAGATCA
CATCGGCATC AATCCGGTGG

4131 ACTTCAAGAA CTCTGTAGCA CCGCCTACAT ACCTCGCTCT GCTAATCCTG
TTACCAGTGG CTGCTGCCAG
TGAAGTTCTT GAGACATCGT GGCGGATGTA TGGAGCGAGA CGATTAGGAC
AATGGTCACC GACGACGGTC

4201 TGGCGATAAG TCGTGTCTTA CCGGGTTGGA CTCAAGACGA TAGTTACCGG
ATAAGGCGCA GCGGTCGGGC
ACCGCTATTC AGCACAGAAT GGCCCAACCT GAGTTCTGCT ATCAATGGCC
TATTCCGCGT CGCCAGCCCG

4271 TGAACGGGGG GTTCGTGCAC ACAGCCCAGC TTGGAGCGAA CGACCTACAC
CGAACTGAGA TACCTACAGC
ACTTGCCCCC CAAGCACGTG TGTCGGGTCG AACCTCGCTT GCTGGATGTG
GCTTGACTCT ATGGATGTCG

4341 GTGAGCTATG AGAAAGCGCC ACGCTTCCCG AAGGGAGAAA GGCGGACAGG
TATCCGGTAA GCGGCAGGGT
CACTCGATAC TCTTTCGCGG TGCGAAGGGC TTCCCTCTTT CCGCCTGTCC
ATAGGCCATT CGCCGTCCCA

4411 CGGAACAGGA GAGCGCACGA GGGAGCTTCC AGGGGGAAAC GCCTGGTATC
TTTATAGTCC TGTCGGGTTT
GCCTTGTCCT CTCGCGTGCT CCCTCGAAGG TCCCCCTTTG CGGACCATAG
AAATATCAGG ACAGCCCAAA

4481 CGCCACCTCT GACTTGAGCG TCGATTTTTG TGATGCTCGT CAGGGGGGCG
GAGCCTATGG AAAAACGCCA
GCGGTGGAGA CTGAACTCGC AGCTAAAAAC ACTACGAGCA GTCCCCCCGC
CTCGGATACC TTTTTGCGGT

Fig. 48H

```
    4551  GCAACGCGGC CTTTTTACGG TTCCTGGCCT TTTGCTGGCC TTTTGCTCAC
ATGTTCTTTC CTGCGTTATC
          CGTTGCGCCG GAAAAATGCC AAGGACCGGA AAACGACCGG AAAACGAGTG
TACAAGAAAG GACGCAATAG

    4621  CCCTGATTCT GTGGATAACC GTATTACCGC CTTTGAGTGA GCTGATACCG
CTCGCCGCAG CCGAACGACC
          GGGACTAAGA CACCTATTGG CATAATGGCG GAAACTCACT CGACTATGGC
GAGCGGCGTC GGCTTGCTGG

    4691  GAGCGCAGCG AGTCAGTGAG CGAGGAAGCG GAAGAGCGCC CAATACGCAA
ACCGCCTCTC CCCGCGCGTT
          CTCGCGTCGC TCAGTCACTC GCTCCTTCGC CTTCTCGCGG GTTATGCGTT
TGGCGGAGAG GGGCGCGCAA

    4761  GGCCGATTCA TTAATGCAGC TGGCACGACA GGTTTCCCGA CTGGAAAGCG
GGCAGTGAGC GCAACGCAAT
          CCGGCTAAGT AATTACGTCG ACCGTGCTGT CCAAAGGGCT GACCTTTCGC
CCGTCACTCG CGTTGCGTTA

    4831  TAATGTGAGT TAGCTCACTC ATTAGGCACC CCAGGCTTTA CACTTTATGC
TTCCGGCTCG TATGTTGTGT
          ATTACACTCA ATCGAGTGAG TAATCCGTGG GGTCCGAAAT GTGAAATACG
AAGGCCGAGC ATACAACACA


BssHII

~~~~~~~
    4901  GGAATTGTGA GCGGATAACA ATTTCACACA GGAAACAGCT ATGACCATGA
TTACGCCAAG CGCGCAATTA
          CCTTAACACT CGCCTATTGT TAAAGTGTGT CCTTTGTCGA TACTGGTACT
AATGCGGTTC GCGCGTTAAT

                                        NcoI

                                        KpnI
                                       ~~~~~
    4971  ACCCTCACTA AAGGGAACAA AAGCTGGGTA C
          TGGGAGTGAT TTCCCTTGTT TTCGACCCAT G
```

Fig. 48 I

Figure 49A

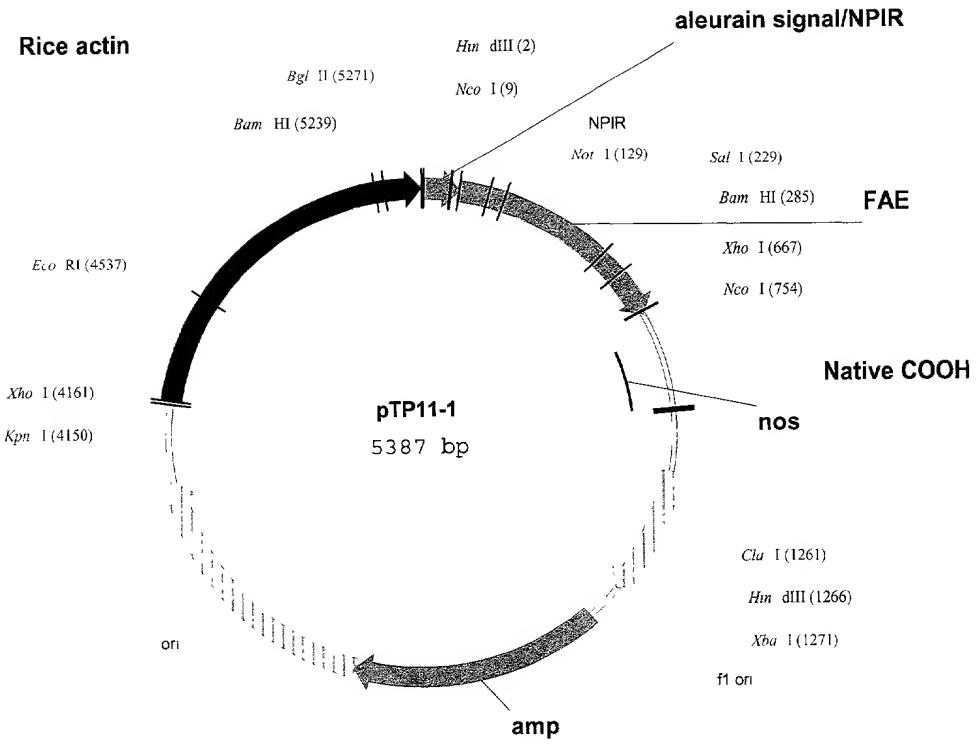

Rice actin
aleurain signal/NPIR
Hin dIII (2)
Bgl II (5271)
Nco I (9)
Bam HI (5239)
NPIR
Not I (129)
Sal I (229)
Bam HI (285)
FAE
Eco RI (4537)
Xho I (667)
Nco I (754)
Native COOH
Xho I (4161)
pTP11-1
5387 bp
nos
Kpn I (4150)
Cla I (1261)
Hin dIII (1266)
Xba I (1271)
ori
f1 ori
amp

Figure 49B

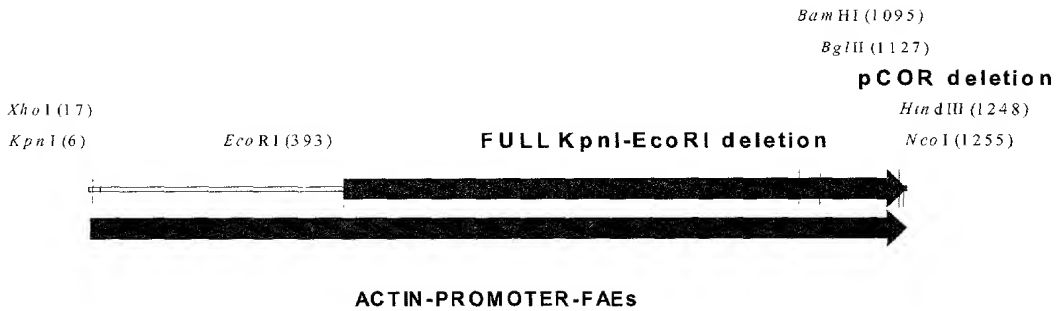
```
                NcoI
                ~~~~~~~
      HindIII
      ~~~~~~
                M  A  H  A  R  V  L  L  L  A  L  A  V  L  A  T  A  A  V  A  V
   1  AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG
                                                                    NotI
                                                                    ~~~~~~~~
      ·  A  S  S  S  S  S  F  A  D  S  N  P  I  R  P  V  T  D  R  A  A  A  S  T  ·
  71  TCGCCTCCTC CTCCTCCTTC GCCGACTCCA ACCCGATCCG GCCCGTCACC GACCGCGCGG CCGCCTCCAC
      ·  Q  G  I  S  E  D  L  Y  S  R  L  V  E  M  A  T  I  S  Q  A  A  Y  A
 141  GCAGGGCATC TCCGAAGACC TCTACAGCCG TTTAGTCGAA ATGGCCACTA TCTCCCAAGC TGCCTACGCC
                      SalI
                      ~~~~~~~
                      AccI
                      ~~~~~~~
       D  L  C  N  I  P  S  T  I  I  K  G  E  K  I  Y  N  S  Q  T  D  I  N  G
 211  GACCTGTGCA ACATTCCGTC GACTATTATC AAGGGAGAGA AAATTTACAA TTCTCAAACT GACATTAACG
         BamHI
         ~~~~~~
      ·  W  I  L  R  D  D  S  S  K  E  I  I  T  V  F  R  G  T  G  S  D  T  N  ·
 281  GATGGATCCT CCGCGACGAC AGCAGCAAAG AAATAATCAC CGTCTTCCGT GGCACTGGTA GTGATACGAA
      ·  L  Q  L  D  T  N  Y  T  L  T  P  F  D  T  L  P  Q  C  N  G  C  E  V
 351  TCTACAACTC GATACTAACT ACACCCTCAC GCCTTTCGAC ACCCTACCAC AATGCAACGG TTGTGAAGTA
       H  G  G  Y  Y  I  G  W  V  S  V  Q  D  Q  V  E  S  L  V  K  Q  Q  V  S
 421  CACGGTGGAT ATTATATTGG ATGGGTCTCC GTCCAGGACC AAGTCGAGTC GCTTGTCAAA CAGCAGGTTA
      ·  Q  Y  P  D  Y  A  L  T  V  T  G  H  X  L  G  A  S  L  A  A  L  T  A  ·
 491  GCCAGTATCC GGACTACGCG CTGACCGTGA CCGGCCACKC CCTCGGCGCC TCCCTGGCGG CACTCACTGC
      ·  A  Q  L  S  A  T  Y  D  N  I  R  L  Y  T  F  G  E  P  R  S  G  N  Q
 561  CGCCCAGCTG TCTGCGACAT ACGACAACAT CCGCCTGTAC ACCTTCGGCG AACCGCGCAG CGGCAATCAG
                                        XhoI
                                        ~~~~~~~
       A  F  A  S  Y  M  N  D  A  F  Q  A  S  S  P  D  T  T  Q  Y  F  R  V  T
 631  GCCTTCGCGT CGTACATGAA CGATGCCTTC CAAGCCTCGA GCCCAGATAC GACGCAGTAT TTCCGGGTCA
                                                          NcoI
                                                          ~~~~~~~
      ·  H  A  N  D  G  I  P  N  L  P  P  V  E  Q  G  Y  A  H  G  G  V  E  Y  ·
 701  CTCATGCCAA CGACGGCATC CCAAACCTGC CCCCGGTGGA GCAGGGGTAC GCCCATGGCG GTGTAGAGTA
      ·  W  S  V  D  P  Y  S  A  Q  N  T  F  V  C  T  G  D  E  V  Q  C  C  E
 771  CTGGAGCGTT GATCCTTACA GCGCCCAGAA CACATTTGTC TGCACTGGGG ATGAAGTGCA GTGCTGTGAG
       A  Q  G  G  Q  G  V  N  N  A  H  T  T  Y  F  G  M  T  S  G  A  C  T  W
 841  GCCCAGGGCG GACAGGGTGT GAATAATGCG CACACGACTT ATTTTGGGAT GACGAGCGGA GCCTGTACAT
      .  *
 911  GGTGATCAGT CATTTCAGCC TCCCCGAGTG TACCAGGAAA GATGGATGTC CTGGAGAGGG GGCCGCGTAA
 981  CCACTGAAGG ATGAGCTGTA AAGAAGCAGA TCGTTCAAAC ATTTGGCAAT AAAGTTTCTT AAGATTGAAT
1051  CCTGTTGCCG GTCTTGCGAT GATTATCATA TAATTTCTGT TGAATTACGT TAAGCATGTA ATAATTAACA
1121  TGTAATGCAT GACGTTATTT ATGAGATGGG TTTTTATGAT TAGAGTCCCG CAATTATACA TTTAATACGC
                                                                        ClaI
1191  GATAGAAAAC AAAATATAGC GCGCAAACTA GGATAAATTA TCGCGCGCGG TGTCATCTAT GTTACTAGAT
          HindIII
          ~~~~~~~
      ClaI       XbaI
      ~~~~       ~~~~~~~
1261  CGATAAGCTT CTAGAGCGGC CGGTGGAGCT CCAATTCGCC CTATAGTGAG TCGTATTACG CGCGCTCACT
1331  GGCCGTCGTT TTACAACGTC GTGACTGGGA AAACCCTGGC GTTACCCAAC TTAATCGCCT TGCAGCACAT
1401  CCCCCTTTCG CCAGCTGGCG TAATAGCGAA GAGGCCCGCA CCGATCGCCC TTCCCAACAG TTGCGCAGCC
1471  TGAATGGCGA ATGGGACGCG CCCTGTAGCG GCGCATTAAG CGCGGCGGGT GTGGTGGTTA CGCGCAGCGT
1541  GACCGCTACA CTTGCCAGCG CCCTAGCGCC CGCTCCTTTC GCTTTCTTCC CTTCCTTTCT CGCCACGTTC
1611  GCCGGCTTTC CCCGTCAAGC TCTAAATCGG GGGCTCCCTT TAGGGTTCCG ATTTAGTGCT TTACGGCACC
1681  TCGACCCCAA AAAACTTGAT TAGGGTGATG GTTCACGTAG TGGGCCATCG CCCTGATAGA CGGTTTTTCG
```

Fig. 49 C

```
1751    CCCTTTGACG TTGGAGTCCA CGTTCTTTAA TAGTGGACTC TTGTTCCAAA CTGGAACAAC ACTCAACCCT
1821    ATCTCGGTCT ATTCTTTTGA TTTATAAGGG ATTTTGCCGA TTTCGGCCTA TTGGTTAAAA AATGAGCTGA
1891    TTTAACAAAA ATTTAACGCG AATTTTAACA AAATATTAAC GCTTACAATT TAGGTGGCAC TTTTCGGGGA
1961    AATGTGCGCG GAACCCCTAT TTGTTTATTT TTCTAAATAC ATTCAAATAT GTATCCGCTC ATGAGACAAT
2031    AACCCTGATA AATGCTTCAA TAATATTGAA AAAGGAAGAG TATGAGTATT CAACATTTCC GTGTCGCCCT
2101    TATTCCCTTT TTTGCGGCAT TTTGCCTTCC TGTTTTTGCT CACCCAGAAA CGCTGGTGAA AGTAAAAGAT
2171    GCTGAAGATC AGTTGGGTGC ACGAGTGGGT TACATCGAAC TGGATCTCAA CAGCGGTAAG ATCCTTGAGA
2241    GTTTTCGCCC CGAAGAACGT TTTCCAATGA TGAGCACTTT TAAAGTTCTG CTATGTGGCG CGGTATTATC
2311    CCGTATTGAC GCCGGGCAAG AGCAACTCGG TCGCCGCATA CACTATTCTC AGAATGACTT GGTTGAGTAC
2381    TCACCAGTCA CAGAAAAGCA TCTTACGGAT GGCATGACAG TAAGAGAATT ATGCAGTGCT GCCATAACCA
2451    TGAGTGATAA CACTGCGGCC AACTTACTTC TGACAACGAT CGGAGGACCG AAGGAGCTAA CCGCTTTTTT
2521    GCACAACATG GGGGATCATG TAACTCGCCT TGATCGTTGG GAACCGGAGC TGAATGAAGC CATACCAAAC
2591    GACGAGCGTG ACACCACGAT GCCTGTAGCA ATGGCAACAA CGTTGCGCAA ACTATTAACT GGCGAACTAC
2661    TTACTCTAGC TTCCCGGCAA CAATTAATAG ACTGGATGGA GGCGGATAAA GTTGCAGGAC CACTTCTGCG
2731    CTCGGCCCTT CCGGCTGGCT GGTTTATTGC TGATAAATCT GGAGCCGGTG AGCGTGGGTC TCGCGGTATC
2801    ATTGCAGCAC TGGGGCCAGA TGGTAAGCCC TCCCGTATCG TAGTTATCTA CACGACGGGG AGTCAGGCAA
2871    CTATGGATGA ACGAAATAGA CAGATCGCTG AGATAGGTGC CTCACTGATT AAGCATTGGT AACTGTCAGA
2941    CCAAGTTTAC TCATATATAC TTTAGATTGA TTTAAAACTT CATTTTTAAT TTAAAAGGAT CTAGGTGAAG
3011    ATCCTTTTTG ATAATCTCAT GACCAAAATC CCTTAACGTG AGTTTTCGTT CCACTGAGCG TCAGACCCCG
3081    TAGAAAAGAT CAAAGGATCT TCTTGAGATC CTTTTTTTCT GCGCGTAATC TGCTGCTTGC AAACAAAAAA
3151    ACCACCGCTA CCAGCGGTGG TTTGTTTGCC GGATCAAGAG CTACCAACTC TTTTTCCGAA GGTAACTGGC
3221    TTCAGCAGAG CGCAGATACC AAATACTGTC CTTCTAGTGT AGCCGTAGTT AGGCCACCAC TTCAAGAACT
3291    CTGTAGCACC GCCTACATAC CTCGCTCTGC TAATCCTGTT ACCAGTGGCT GCTGCCAGTG GCGATAAGTC
3361    GTGTCTTACC GGGTTGGACT CAAGACGATA GTTACCGGAT AAGGCGCAGC GGTCGGGCTG AACGGGGGGT
3431    TCGTGCACAC AGCCCAGCTT GGAGCGAACG ACCTACACCG AACTGAGATA CCTACAGCGT GAGCTATGAG
3501    AAAGCGCCAC GCTTCCCGAA GGGAGAAAGG CGGACAGGTA TCCGGTAAGC GGCAGGGTCG GAACAGGAGA
3571    GCGCACGAGG GAGCTTCCAG GGGGAAACGC CTGGTATCTT TATAGTCCTG TCGGGTTTCG CCACCTCTGA
3641    CTTGAGCGTC GATTTTTGTG ATGCTCGTCA GGGGGGCGGA GCCTATGGAA AAACGCCAGC AACGCGGCCT
3711    TTTTACGGTT CCTGGCCTTT TGCTGGCCTT TTGCTCACAT GTTCTTTCCT GCGTTATCCC CTGATTCTGT
3781    GGATAACCGT ATTACCGCCT TTGAGTGAGC TGATACCGCT CGCCGCAGCC GAACGACCGA GCGCAGCGAG
3851    TCAGTGAGCG AGGAAGCGGA AGAGCGCCCA ATACGCAAAC CGCCTCTCCC CGCGCGTTGG CCGATTCATT
3921    AATGCAGCTG GCACGACAGG TTTCCCGACT GGAAAGCGGG CAGTGAGCGC AACGCAATTA ATGTGAGTTA
3991    GCTCACTCAT TAGGCACCCC AGGCTTTACA CTTTATGCTT CCGGCTCGTA TGTTGTGTGG AATTGTGAGC
4061    GGATAACAAT TTCACACAGG AAACAGCTAT GACCATGATT ACGCCAAGCG CGCAATTAAC CCTCACTAAA
                        KpnI            XhoI
                        ~~~~~~~         ~~~~~~
4131    GGGAACAAAA GCTGGGTACC GGGCCCCCCC TCGAGGTCAT TCATATGCTT GAGAAGAGAG TCGGGATAGT
4201    CCAAAATAAA ACAAAGGTAA GATTACCTGG TCAAAAGTGA AAACATCAGT TAAAAGGTGG TATAAGTAAA
4271    ATATCGGTAA TAAAAGGTGG CCCAAAGTGA AATTTACTCT TTTCTACTAT TATAAAAATT GAGGATGTTT
4341    TGTCGGTACT TTGATACGTC ATTTTTGTAT GAATTGGTTT TTAAGTTTAT TCGCGATTTG GAAATGCATA
4411    TCTGTATTTG AGTCGGTTTT TAAGTTCGTT GCTTTTGTAA ATACAGAGGG ATTTGTATAA GAAATATCTT
                                                                    EcoRI
                                                                    ~~~~~~
4481    TAAAAAACCC ATATGCTAAT TTGACATAAT TTTTGAGAAA AATATATATT CAGGCGAATT CCACAATGAA
4551    CAATAATAAG ATTAAAATAG CTTGCCCCCG TTGCAGCGAT GGGTATTTTT TCTAGTAAAA TAAAAGATAA
4621    ACTTAGACTC AAAACATTTA CAAAAACAAC CCCTAAAGTC CTAAAGCCCA AAGTGCTATG CACGATCCAT
4691    AGCAAGCCCA GCCCAACCCA ACCCAACCCA ACCCACCCCA GTGCAGCCAA CTGGCAAATA GTCTCCACCC
4761    CCGGCACTAT CACCGTGAGT TGTCCGCACC ACCGCACGTC TCGCAGCCAA AAAAAAAAAA AGAAAGAAAA
4831    AAAAGAAAAA GAAAAACAGC AGGTGGGTCC GGGTCGTGGG GGCCGGAAAA GCGAGGAGGA TCGCGAGCAG
4901    CGACGAGGCC CGGCCCTCCC TCCGCTTCCA AAGAAACGCC CCCCATCGCC ACTATATACA TACCCCCCCC
4971    TCTCCTCCCA TCCCCCCAAC CCTACCACCA CCACCACCAC CACCTCCTCC CCCCTCGCTG CCGGACGACG
5041    AGCTCCTCCC CCCTCCCCCT CCGCCGCCGC CGGTAACCAC CCCGCCCCTC TCCTCTTTCT TTCTCCGTTT
5111    TTTTTTTCGT CTCGGTCTCG ATCTTTGGCC TTGGTAGTTT GGGTGGGCGA GAGCGGCTTC GTCGCCCAGA
                                                                    BamHI
                                                                    ~~~~~~
5181    TCGGTGCGCG GGAGGGGCGG GATCTCGCGG CTGGCGTCTC CGGGCGTGAG TCGGCCCGGA TCCTCGCGGG
                            BglII
                            ~~~~~~
5251    GAATGGGGCT CTCGGATGTA GATCTTCTTT CTTTCTTCTT TTTGTGGTAG AATTTGAATC CCTCAGCATT
5321    GTTCATCGGT AGTTTTTCTT TTCATGATTT GTGACAAATG CAGCCTCGTG CGGAGCTTTT TTGTAGC
```

Figure 50A

Actin promoter -FAEs



ACTIN-PROMOTER-FAEs
1259 bp

KpnI XhoI

```
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      CCATGGCCCG GGGGGGAGCT CCAGTAAGTA TACGAACTCT TCTCTCAGCC CTATCAGGTT TTATTTTGTT

  71  AGGTAAGATT ACCTGGTCAA AAGTGAAAAC ATCAGTTAAA AGGTGGTATA AGTAAAATAT CGGTAATAAA
      TCCATTCTAA TGGACCAGTT TTCACTTTTG TAGTCAATTT TCCACCATAT TCATTTTATA GCCATTATTT

 141  AGGTGGCCCA AAGTGAAATT TACTCTTTTC TACTATTATA AAAATTGAGG ATGTTTTGTC GGTACTTTGA
      TCCACCGGGT TTCACTTTAA ATGAGAAAAG ATGATAATAT TTTTAACTCC TACAAAACAG CCATGAAACT

 211  TACGTCATTT TTGTATGAAT TGGTTTTTAA GTTTATTCGC GATTTGGAAA TGCATATCTG TATTTGAGTC
      ATGCAGTAAA AACATACTTA ACCAAAAATT CAAATAAGCG CTAAACCTTT ACGTATAGAC ATAAACTCAG

 281  GGTTTTTAAG TTCGTTGCTT TTGTAAATAC AGAGGGATTT GTATAAGAAA TATCTTTAAA AAACCCATAT
      CCAAAAATTC AAGCAACGAA AACATTTATG TCTCCCTAAA CATATTCTTT ATAGAAATTT TTTGGGTATA

                                                    EcoRI
                                                    ~~~~~~
 351  GCTAATTTGA CATAATTTTT GAGAAAAATA TATATTCAGG CGAATTCCAC AATGAACAAT AATAAGATTA
      CGATTAAACT GTATTAAAAA CTCTTTTTAT ATATAAGTCC GCTTAAGGTG TTACTTGTTA TTATTCTAAT

 421  AAATAGCTTG CCCCCGTTGC AGCGATGGGT ATTTTTTCTA GTAAAATAAA AGATAAACTT AGACTCAAAA
      TTTATCGAAC GGGGGCAACG TCGCTACCCA TAAAAAAGAT CATTTTATTT TCTATTTGAA TCTGAGTTTT

 491  CATTTACAAA AACAACCCCT AAAGTCCTAA AGCCCAAAGT GCTATGCACG ATCCATAGCA AGCCCAGCCC
      GTAAATGTTT TTGTTGGGGA TTTCAGGATT TCGGGTTTCA CGATACGTGC TAGGTATCGT TCGGGTCGGG

 561  AACCCAACCC AACCCAACCC ACCCCAGTGC AGCCAACTGG CAAATAGTCT CCACCCCCGG CACTATCACC
      TTGGGTTGGG TTGGGTTGGG TGGGGTCACG TCGGTTGACC GTTTATCAGA GGTGGGGGCC GTGATAGTGG

 631  GTGAGTTGTC CGCACCACCG CACGTCTCGC AGCCAAAAAA AAAAAAAGAA AGAAAAAAAA GAAAAAGAAA
      CACTCAACAG GCGTGGTGGC GTGCAGAGCG TCGGTTTTTT TTTTTTCTTT TCTTTTTTTT CTTTTTCTTT

 701  AACAGCAGGT GGGTCCGGGT CGTGGGGGCC GGAAAAGCGA GGAGGATCGC GAGCAGCGAC GAGGCCCGGC
      TTGTCGTCCA CCCAGGCCCA GCACCCCCGG CCTTTTCGCT CCTCCTAGCG CTCGTCGCTG CTCCGGGCCG
```

Figure 50 B

```
 771  CCTCCCTCCG CTTCCAAAGA AACGCCCCCC ATCGCCACTA TATACATACC CCCCCCTCTC CTCCCATCCC
      GGAGGGAGGC GAAGGTTTCT TTGCGGGGGG TAGCGGTGAT ATATGTATGG GGGGGGAGAG GAGGGTAGGG

 841  CCCAACCCTA CCACCACCAC CACCACCACC TCCTCCCCCC TCGCTGCCGG ACGACGAGCT CCTCCCCCCT
      GGGTTGGGAT GGTGGTGGTG GTGGTGGTGG AGGAGGGGGG AGCGACGGCC TGCTGCTCGA GGAGGGGGGA

 911  CCCCCTCCGC CGCCGCCGGT AACCACCCCG CCCCTCTCCT CTTTCTTTCT CCGTTTTTTT TTTCGTCTCG
      GGGGGAGGCG GCGGCGGCCA TTGGTGGGGC GGGGAGAGGA GAAAGAAAGA GGCAAAAAAA AAAGCAGAGC

 981  GTCTCGATCT TTGGCCTTGG TAGTTTGGGT GGGCGAGAGC GGCTTCGTCG CCCAGATCGG TGCGCGGGAG
      CAGAGCTAGA AACCGGAACC ATCAAACCCA CCCGCTCTCG CCGAAGCAGC GGGTCTAGCC ACGCGCCCTC

                                                  BamHI
                                                  ~~~~~~
1051  GGGCGGGATC TCGCGGCTGG CGTCTCCGGG CGTGAGTCGG CCCGGATCCT CGCGGGGAAT GGGGCTCTCG
      CCCGCCCTAG AGCGCCGACC GCAGAGGCCC GCACTCAGCC GGGCCTAGGA GCGCCCCTTA CCCCGAGAGC

           BglII
           ~~~~~~~
1121  GATGTAGATC TTCTTTCTTT CTTCTTTTTG TGGTAGAATT TGAATCCCTC AGCATTGTTC ATCGGTAGTT
      CTACATCTAG AAGAAAGAAA GAAGAAAAAC ACCATCTTAA ACTTAGGGAG TCGTAACAAG TAGCCATCAA

                                                            HindIII  NcoI
                                                            ~~~~~~~ ~~~~~
1191  TTTCTTTTCA TGATTTGTGA CAAATGCAGC CTCGTGCGGA GCTTTTTTGT AGGTAGAAGC TTACCATGG
      AAAGAAAAGT ACTAAACACT GTTTACGTCG GAGCACGCCT CGAAAAAACA TCCATCTTCG AATGGTACC
```

Kpn1-EcoR1 - deletion underlined and restored NCO site in bold in vectors pJQ4.9, pJQ3.2 and pJO6.3.

Figure 51

ALEURAIN_deleted NPIR (Apoplast) structure and sequence

ALEURAIN-NPIR-DEL
93 bp

```
  +1          M   A  H  A   R  V  L   L  L  A  L   A  V  L   A  T  A   A  V  A
    HindIII NcoI
    ~~~~~~ ~~~~~~~
1   AAGCTTACCA TGGCCCACGC CCGCGTCCTC CTCCTGGCGC TCGCCGTGCT GGCCACGGCC GCCGTCGCCG
    TTCGAATGGT ACCGGGTGCG GGCGCAGGAG GAGGACCGCG AGCGGCACGA CCGGTGCCGG CGGCAGCGGC

 +1 V  A  S  S   R  A  A
                  NotI
                 ~~~~~~~~~
71  TCGCCTCCTC CCGCGCGGCC GCC
    AGCGGAGGAG GGCGCGCCGG CGG
```

Figure 52

SEE1 (Senescence enhanced) PROMOTER sequence

```
   1   CATGGGCCAG GTATAATTAT GGGATATCTC AAGCAAATAA TCGAAATATC ACCATTGGCT ACAATATCTG
                      PstI                          XbaI    XbaI
                     ~~~~~~~                       ~~~~~~~ ~~~~~~
  71   AGCTCCGAGT TCTGACTGCA GTCTGGATGA CGCGTGTTGT ATCTAGAACT CTAGATAGCA CAGCCACAGC
 141   ACCTACAGGA GTGCGACACT TGTGGACTGT AGTAGTGTTG GAGACGGAGC TCTTTCCTAC CTCCTGACGT
 211   TGCCGCCGTT GTCCATTCCA ACGGCATCAC TCTCAACCAA TCACGCGCTC CCAACAAAAT ATCGTCCCCC
 281   ATGTCTTGGC GGAGAGAGAG TACATACATG CTGTCGCGCC GTTTTTGTCT GAATCTCGCT TCCACTGGCC
                    SmaI
                   ~~~~~~~
 351   AATCAGCTCA GCTCCCGGGA GCTCACTCAT TCAAGATCCC ATCGTCGTCG TCACCCCTGG CGTCATGGGA
 421   TGGAAAAGAA CCTCCGTTGC TCGGATGAGT CAGCCATATC CCCGAACAGA GTACTGCAAG ATAACCCAAT
                                    SphI
                                   ~~~~~~~
 491   TCAGATTCCC CCAATAGAGA AAGTATAGCA TGCTTTCGGG TTTTGTTTGG CTTAATTGAC TTTATTTTTG
 561   TTGGAGTTGA ATGCTGATTT GTTGTGTAAA ATGCCCAACC ATCTGAATAT CGAGACGGAT AATAGGCTGG
 631   CTAATTAATT TATAGCAAGA TTCTGTAGTG CACATCGCAA ATATCTTTCT GGGCATTACA GCTGGAGGCT
                         PstI
                        ~~~~~~~
 701   TCATCAGCCT GAAACACTCT GCAGAGCCTG AAGCAAGTGG TGAAGCGTGG CGATGAGATG GGTATAAAAC
 771   CCCCGGCACC GGGACGCGAG CTCCCGCCTA CCAGTACCAT CTCGCCTCGC TCCCCCTGCC GGACGACCCA
 841   GTAAAATACT GTTGCCCACT CGCCGGCGAG ATG
```

Figure 53

SEE1 (Senescence enhanced) PROMOTER plus vacuolar aleurain SIGNAL/NPIR sequence

```
   1  CATGGGCCAG GTATAATTAT GGGATATCTC AAGCAAATAA TCGAAATATC ACCATTGGCT ACAATATCTG
                     PstI                          XbaI    XbaI
                     ~~~~~~~                       ~~~~~~~ ~~~~~~
  71  AGCTCCGAGT TCTGACTGCA GTCTGGATGA CGCGTGTTGT ATCTAGAACT CTAGATAGCA CAGCCACAGC
 141  ACCTACAGGA GTGCGACACT TGTGGACTGT AGTAGTGTTG GAGACGGAGC TCTTTCCTAC CTCCTGACGT
 211  TGCCGCCGTT GTCCATTCCA ACGGCATCAC TCTCAACCAA TCACGCGCTC CCAACAAAAT ATCGTCCCCC
 281  ATGTCTTGGC GGAGAGAGAG TACATACATG CTGTCGCGCC GTTTTTGTCT GAATCTCGCT TCCACTGGCC
                    SmaI
                    ~~~~~~~
 351  AATCAGCTCA GCTCCCGGGA GCTCACTCAT TCAAGATCCC ATCGTCGTCG TCACCCCTGG CGTCATGGGA
 421  TGGAAAAGAA CCTCCGTTGC TCGGATGAGT CAGCCATATC CCCGAACAGA GTACTGCAAG ATAACCCAAT
                                    SphI
                                    ~~~~~~~
 491  TCAGATTCCC CCAATAGAGA AAGTATAGCA TGCTTTCGGG TTTTGTTTGG CTTAATTGAC TTTATTTTTG
 561  TTGGAGTTGA ATGCTGATTT GTTGTGTAAA ATGCCCAACC ATCTGAATAT CGAGACGGAT AATAGGCTGG
 631  CTAATTAATT TATAGCAAGA TTCTGTAGTG CACATCGCAA ATATCTTTCT GGGCATTACA GCTGGAGGCT
                          PstI
                          ~~~~~~~
 701  TCATCAGCCT GAAACACTCT GCAGAGCCTG AAGCAAGTGG TGAAGCGTGG CGATGAGATG GGTATAAAAC
 771  CCCCGGCACC GGGACGCGAG CTCCCGCCTA CCAGTACCAT CTCGCCTCGC TCCCCCTGCC GGACGACCCA
                                      M  A  H  G   R  I  L   F  L  A   L  A  V  L
 841  GTAAAATACT GTTGCCCACT CGCCGGCGAG ATGGCCCACG GCCGCATCCT CTTCTTGGCG CTCGCCGTCT
                                                                          BssHII
                                                                             NotI
      ·  A  T  A   A  V  A   A  A  S  L   A  D  S   N  P  I   R  P  V  T   E  R  A ·
 911  TGGCCACCGC CGCGGTGGCC GCCGCATCNT TGGCGGACTC CAACCCGATC CGGCCCGTCA CCGAGCGCGC
       NotI
      ~~~~~~
      · A  A
 981  GGCCGCC
```